Note: When any ambiguity of interpretation is found in this provisional translation, the Japanese text shall prevail.

Case Examples pertinent to AI-related technology

With respect to patent applications pertinent to AI-related technology, a total of 25 cases are listed in Annex A and Annex B of the Examination Handbook for Patent and Utility Model as examples of the operation when the Examination Guidelines for Patent and Utility Model are applied.

1. Determination on the Description Requirements for the Description and Claims

The determination on the description requirements for the description and claims of AI-related inventions (Enablement requirement, Support requirement and Clarity requirement) is made in accordance with the "Enablement Requirement" (Section 1, Chapter 1 of Part II), "Support Requirement" (Section 2, Chapter 2 of Part II) and "Clarity Requirement" (Section 3, Chapter 2 of Part II) in Examination Guidelines for Patent and Utility Model in the same way as that in the other inventions.

AI-related inventions include inventions taking advantage of AI-related technology in various technical fields and inventions of product which is presumed to have a certain function because of AI. Case examples are designed for such inventions.

Enablement requirement and Support requirement
(Correlation of multiple data contained in training data)

Generally, a training data containing multiple types of data for machine learning of AI is used in inventions taking advantage of AI-related technology in various technical fields. Any of the following conditions is essential for such cases to satisfy the description requirements, that is,

- the condition where it can be recognized that there is a certain relation such as a correlation among the multiple types of data based on the disclosure in the description, or
- the condition where it can be presumed that there is a certain relation such as a correlation among the multiple types of data in view of a common general knowledge.

However, the description does not necessarily need to disclose a certain relation such as a specific correlation among multiple types of data (see Case 46, Case 47, Case 48, Case 49, Case 50 and Case 54).

(Method of generating data pertaining to teacher data)

Inventions of product which is presumed to have a certain function because of AI cannot satisfy Enablement Requirement and Support Requirement without an embodiment in the description in which an evaluation on the function is made using a product that has actually been made, unless an estimation result by AI can be a substitution for an evaluation on a product that has actually been made[1] (Case 51 and Case 52).

[1] Possible cases where an estimation results by AI can be a substitution for an evaluation on a product that has actually been made include "where the estimation accuracy of the estimated

It should also be noted that even if the invention does not relate to "the machine learning of AI per se" or "the estimation by AI per se", such as "the method of generating data pertaining to training data", it does not necessarily satisfy the support requirement if the "AI subject to machine learning" or the "content of training data pertaining to machine learning," etc., are means to solve a problem of the invention, but are not recited in the claims (Case 53).

Clarity Requirement

If it is clear in consideration of description, drawings and the common general knowledge at the time of filing that the claimed invention is a "program" even though the claimed subject matter is any word other than the "program" (for example, "module," "library," "neural network," "support vector machine" or "model") the claimed invention is handled as the "program." In this case, the claimed invention shall not be considered a violation of clarity requirement because the claimed subject matter is any word other than the "program" (Refer to 1.2.1.2 Points to note (1), Chapter 1 Computer Software-Related Inventions, Annex B of the Examination Handbook).

On the other hand, if the claimed subject matter is a word "trained model," etc., but there is no recitation relating to "computer" at all in the claims and it is not clear whether or not it means "program" that is a command to a computer, taking into account the description, etc., and common general knowledge, it does not satisfy Clarity Requirement as the category is unclear.

List of Case Examples

(Annex A, 1. Case Examples pertinent to Description Requirements)

Added on March 13, 2024

Relations among the case examples pertinent to Enable Requirement and Support Requirement are shown in the following “Overview of Case Examples as to Enablement Requirement and Support Requirement.”

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values indicated by the AI has been verified in the description or other documents" and "where there was common general knowledge at the time of filing that the estimation results by AI can be a substitution for an evaluation on a product that has actually been made."

These case examples were made to explain examination practice on the description requirements. The claims in these case examples are modified with a simple wording to help understanding of determination on the description requirements.

2. Determination on the Inventive Step

Determination on the inventive step of AI-related inventions is made in accordance with "Inventive Step" (Section 2, Chapter 2 of Part III) in Examination Guidelines for Patent and Utility Model" in the same way as that in the other technical fields.

Newly added Case Examples were created focusing on three aspects, that is, mere an application of AI (Case 33 and Case 34), modification of training data (Case 34 and Case 35) and preprocessing of training data (Case 36)[2].

In March 2024, the list of case examples was expanded to include the application of generative AI (cases 37 and 38), the changes in AI estimation methods (case 39), and the systematization of human work (case 40).

List of Case Examples

(Annex A, 5. Case Examples pertinent to Inventive Step)

Added on March 13, 2024

Relations among the case examples are shown in the following "Overview of Case Examples as to Inventive Step."

These case examples were made to explain examination practice on the inventive step determination. The claims in these case examples are modified with a simple wording to help understanding of determination on the inventive step.

Further, the cited documents and common general knowledge in these Case Examples are only a premise for explanation of inventive step determination, and not the prior art or common

[2] Prior to this addition, there were only two cases in Annex A that also served as case examples of IoT-related technologies (Case 31 and Case 32).

general knowledge at the time when each of Case Examples was added to Examination Handbook for Patent and Utility Model.

3. Determination on Eligibility for Patent

3 AI-related Case Examples (Case 3-2, Case 2-13 and Case 2-14) had already been incorporated in Examination Handbook for Patent and Utility Model.

These three were added to Examination Handbook for Patent and Utility Model on September 28, 2016, and March 22, 2017, as a part of Case Examples, to enhance an exemplary explanation of examination practice on patent applications of IoT-related technology in accordance with Examination Guidelines for Patent and Utility Model.

Two more case examples were added in March 2024.

For the relationship between the individual cases, please refer to "Overview of Case Examples as to Eligibility for Patent."

List of Case Examples

(Annex A, 3. Eligibility for Patent and Industrial Applicability)

Sugar Content Data of Apples and a Method for Predicting Sugar Content Data of Apples .....Case 3-2

Training Data and Method for Generating Images for Training Data .....Case 5

Added on March 13, 2024

(Annex B, Chapter 1, 3.2 Case for eligibility for invention)

Data Structure of Dialogue Scenarios in Voice Interactive System .....Case 2-13

Trained Model for Analyzing Reputations of Accommodations .....Case 2-14

Trained Model for Analyzing Reputations of Accommodations .....Case 2-14’

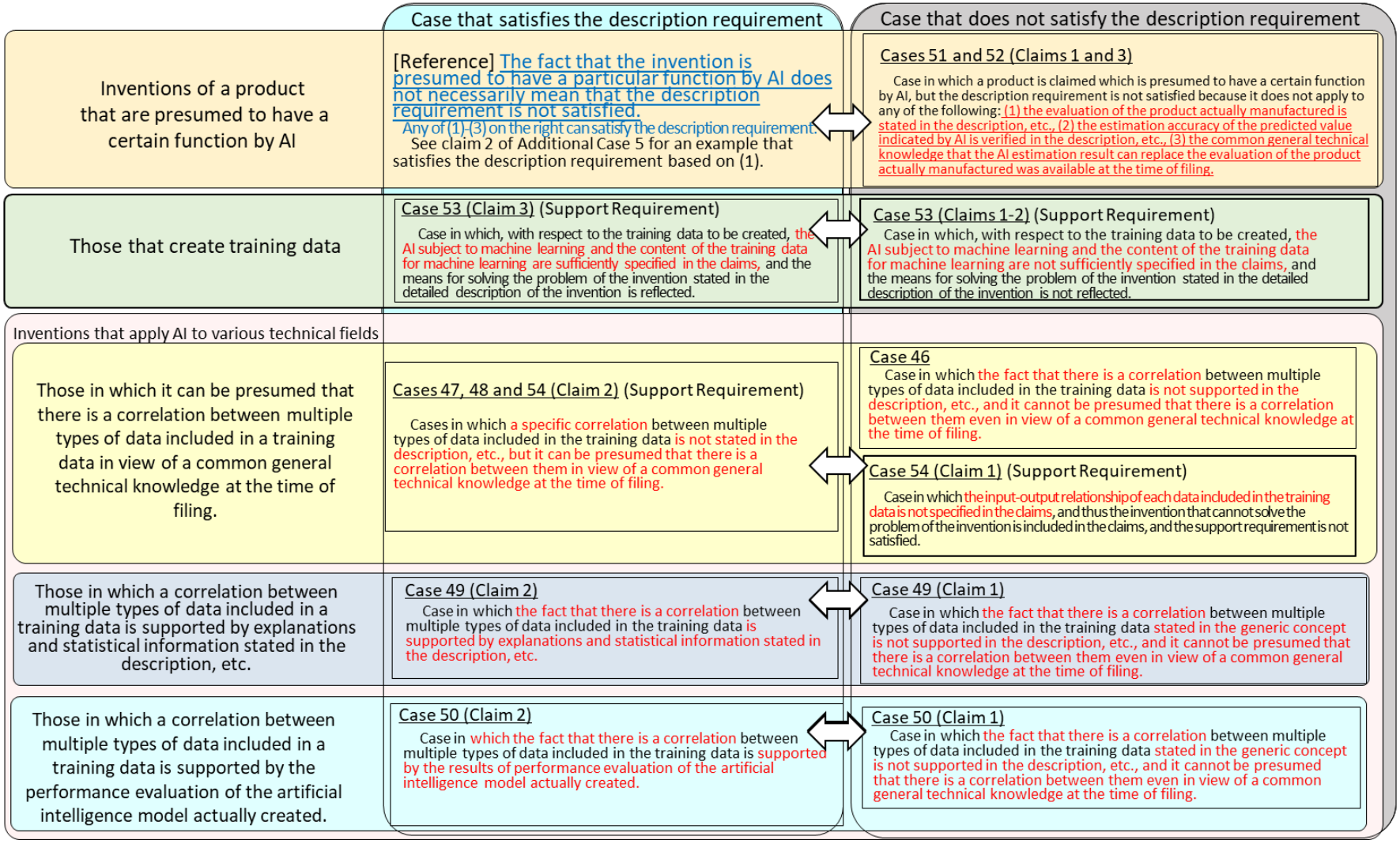
Added on March 13, 2024

4. Points to note

The cases described in the following pages are not intended to recommend the particular way of description of the claims for patent applications of AI-related technology.

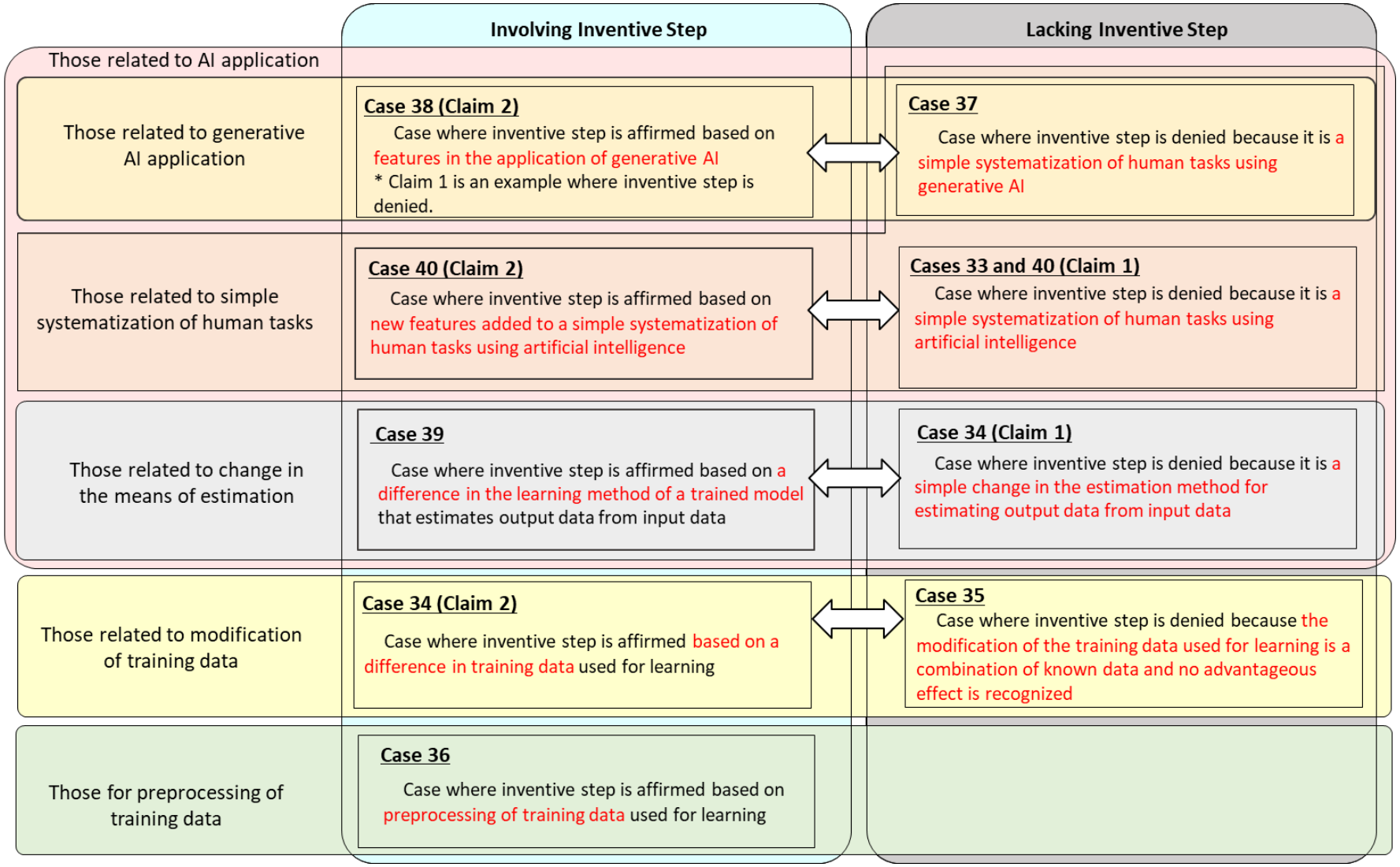
For other considerations, please refer to “Points to note” at the beginning of Annex A and B.

Overview of Case Examples as to Enablement Requirement and Support Requirement

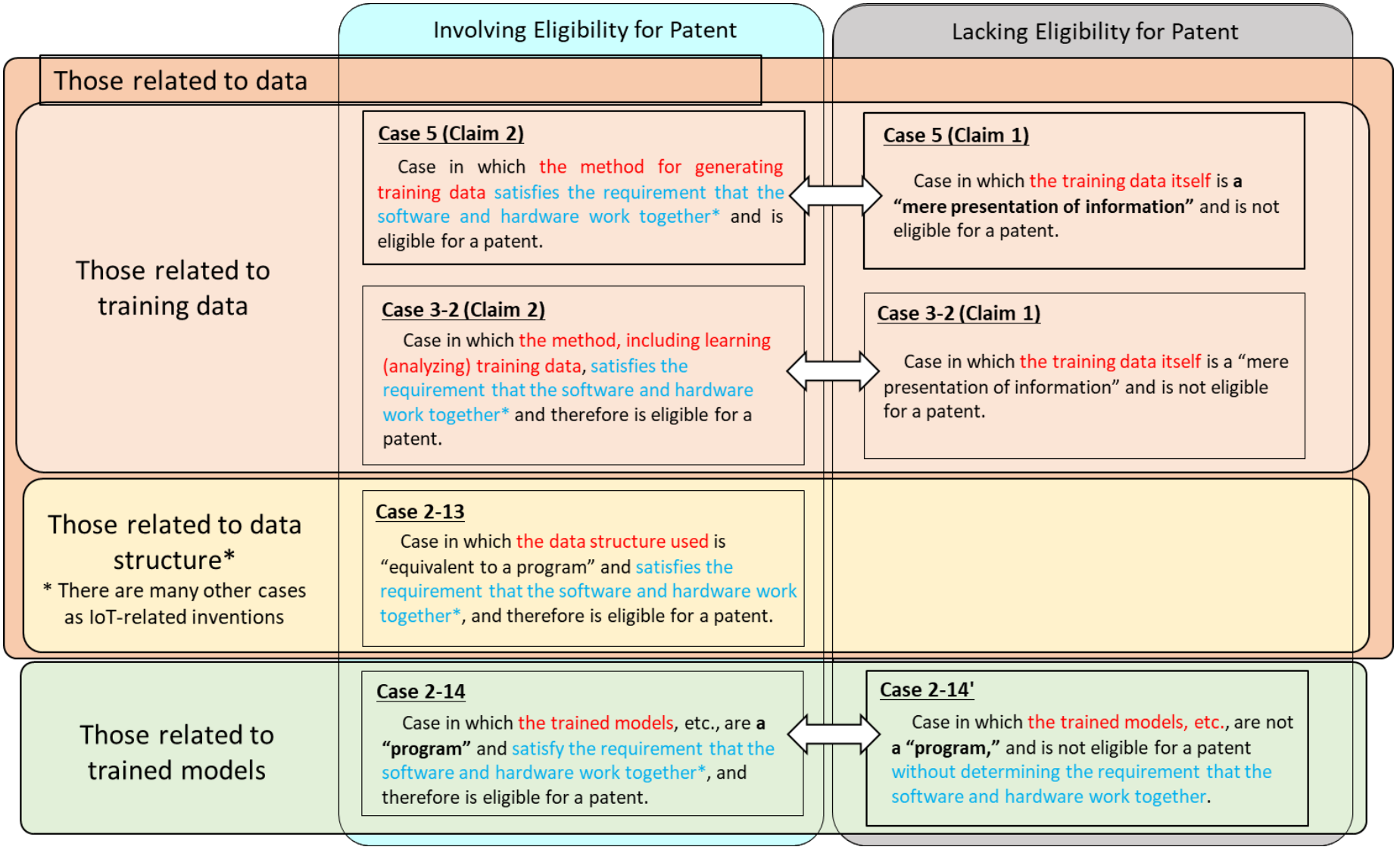


*Cases marks as (Support Requirement) are for support requirement only.

Overview of Case Examples as to Inventive Step



Overview of Case Examples as to Eligibility for Patent



Case examples of "Examination Guidelines for Patent and Utility Model" for AI-related technology

Table of Contents

1. Cases pertinent to the Description Requirements for the Description and Claims

[Case 46]

Title of the Invention

SUGAR CONTENT ESTIMATION SYSTEM

What is claimed is:

[Claim 1]

A sugar content estimation system comprising:

a storage means for storing face images of people and sugar contents of vegetables produced by the people;

a model generation means for generating a determination model through machine learning, to which a face image of a person is input and from which a sugar content of a vegetable produced by the person is output, using training data containing the face images of the people stored in the storage means and the sugar contents of the vegetables,

a reception means for receiving an input of a face image; and

a processing means for outputting, using the generated determination model that has been generated by the model generation means, a sugar content of a vegetable produced by a person that is estimated based on the face image of the person inputted to the reception means.

Overview of the Description

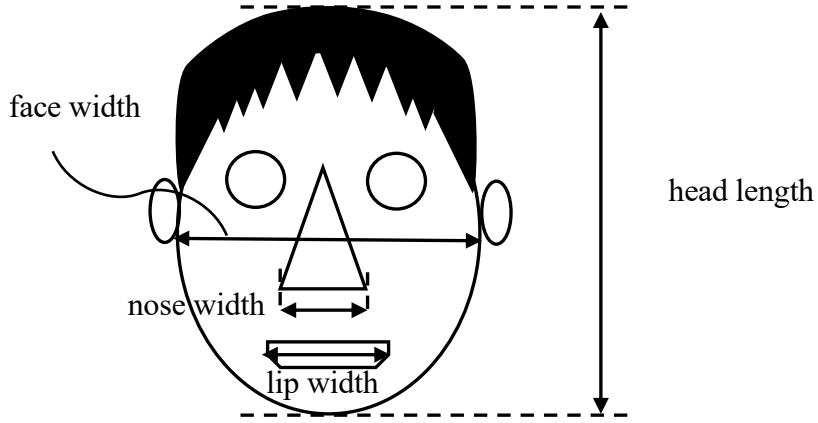
It is an object of the present invention to provide a system that estimates a sugar content of a vegetable produced by a person based on his/her face image, taking advantage of the existence of a certain correlation between a face feature of a person and a sugar content of a vegetable produced by the person. For example, a face figure is characterized by a head length, face width, nose width, and lip width as shown in the figure. Here, a "sugar content" of a vegetable means a sugar content at the time when a certain period predetermined for each type of vegetables has passed after seeding. With this system, it is possible to estimate which person can produce a vegetable with the highest sugar content in a community.

A sugar content estimation system of the present invention firstly receives an input of a face image of a person by a user. A sugar content of a vegetable produced by a person is obtained using a determination model, to which a face image of the person is input and from which a sugar content of the vegetable produced by the person is output. The determination model is generated through a supervised machine learning using a known machine learning algorithm such as a convolutional neural network (CNN) by learning correlation between a face image of a person and a sugar content of a vegetable produced by the person.

Note:

In this case, it is assumed that, even in view of a common general technical knowledge at the time of filing, a person skilled in the art cannot presume a certain relation such as a

correlation (hereinafter, referred to as a “correlation or the like” in this Case Example) between a face image of a person and a sugar content of a vegetable produced by the person.



Figure

[Overview of Reason for Refusal]

- Article 36(4)(i) (Enablement Requirement)

According to the description, a human face image is used for an input to a determination model that estimates a sugar content of a vegetable produced by the person. The description says that a face feature is characterized by a head length, face width, nose width, and lip width, for example.

However, the description only discloses that there is a certain correlation between a face image of a person and a sugar content of a vegetable produced by the person and does not disclose any correlation or the like between them, though disclosing that a face feature is characterized by a head length, face width, nose width, and lip width, for example. It cannot be presumed that there is a correlation or the like between them, even if a common general technical knowledge at the time of filing is taken into consideration. Further, there is no performance evaluation result of an actually generated determination model shown in the description.

Accordingly, it is not possible for a person skilled in the art to derive a sugar content estimation system that outputs an estimation of a sugar content of a vegetable produced by a person based on an input of a face image of the person, even if the disclosure in the description and a common general technical knowledge at the time of filing are taken into consideration.

Therefore, a “sugar content estimation system” in Claim 1 is not disclosed in the description in a manner that a person skilled in the art can make and use the system. In other words, the description does not provide a clear and sufficient disclosure for a person skilled in the art to carry out the invention.

Measures to be Taken by the Applicant

The reason for refusal cannot be overcome, unless the applicant prove that a person skilled in the art can presume a correlation or the like between a face image of a person contained in a training data for machine learning in the estimation model of the present invention and a sugar content of a vegetable produced by the person.

Further, the reason for refusal cannot be overcome, even if the applicant submits a certificate of experimental results that supports the estimation by the trained model of Claim 1 to make an argument that an object of the invention can be attained.

[Case 47]

Title of the Invention

BUSINESS PLAN DESIGN APPARATUS

What is claimed is:

[Claim 1]

A business plan design apparatus comprising:

a storage means for storing a stock amount of a specific product;

a reception means for receiving a web advertisement data and mention data of the specific product;

a simulation and output means for, using an estimation model that has been trained through machine learning with a training data containing a web advertisement data and mention data of a similar product that has been sold in the past and a sales quantity of the similar product, simulating and outputting a future sales quantity of the specific product estimated based on the web advertisement data and mention data of the specific product;

a production plan making means for planning a future production quantity of the specific product, based on the stored stock amount and the output sales quantity; and

an output means for outputting the output sales quantity and the production plan.

Overview of the Description

As the internet is widely spreading, a web advertisement has become an effective way for sales promotion of a product. However, it cannot readily be determined on-site whether a web advertisement is actually effective, and through trial and error, not a few business opportunities have been wasted due to stock shortage or the like. In view of this, it is an object of the present invention to provide a business plan design apparatus that estimates a sales quantity of a specific product in the future based on a web advertisement data and mention data of the product, and presents a production plan of the product including a future production quantity based on a stored stock amount and an estimated sales quantity. With this apparatus, a seller of a specific product can revise a production plan of the product at an early stage.

The business plan design apparatus firstly stores a stock amount of a specific product. The apparatus then obtains an estimated product sales quantity of the product based on an input of a web advertisement data and mention data of the product, using an estimation model that outputs an estimated product sales quantity. In this case, the web advertisement data is the number of times when the specific product publicly appeared on the web. The advertisement includes banner ads, product listing ads, and direct e-mails. The mention data includes reviews on the product or advertisement in web articles, social media, and blogs etc. In the reviews on the product or advertisement, an evaluation value is set so that it becomes greater if there are a lot of positive reviews, and otherwise, it becomes lower. The evaluation value can be obtained through a known computer processing on the text in web articles, social media, and blogs etc.

The estimation model is generated through a supervised machine learning with a training data using a known machine learning algorithm such as a neural network. The training data contains a relation between a web advertisement data and mention data of a similar product that has been sold in the past and an actual sales quantity of the similar product.

The model compares the stored stock amount and the estimated sales quantity of the product. Then, the model makes a plan for an increased production if the sales quantity exceeds the stored stock amount, and otherwise, makes a plan for a decreased production.

The apparatus, using the estimation model that has been trained in this way, simulates a sales quantity of a product, compares the sales quantity and a stock amount of the product, and presents the comparison in a manner that a user can readily determine whether a production of the product should be increased or decreased.

Note:

In this case, it is assumed that, in view of a common general technical knowledge at the time of filing, a person skilled in the art can presume a certain relation such as a correlation (hereinafter, referred to as a "correlation or the like" in this Case Example) between advertisement data and reference data on the web.

[Overview of Reason for Refusal]

There is no reason for refusal found.

Notes

・ Article 36(4)(i) (Enablement Requirement)

The description discloses that a web advertisement data and mention data are used. The web advertisement data is based on the number of times when a specific product publicly appeared on the web, and the mention data is based on an evaluation value of reviews on the product or advertisement in web articles, social media, and blogs etc.

Although the description does not disclose a correlation or the like between the web advertisement data and the mention data, it can be presumed that there is a correlation or the like between them in view of a common general technical knowledge at the time of filing.

Further, it is known at the time of filing that an estimation model can be generated that estimates an output in response to an input through machine learning with a training data containing an input data and output data having a correlation or the like, using a generally-used machine learning algorithm.

In view of the above, an estimation model can be generated using a universal machine learning algorithm with a training data containing the number of times when a similar product publicly appeared on a web advertisement, an evaluation value of reviews on the product or advertisement in web articles, social media, and blogs etc., and a sales quantity of the similar product. Accordingly, it is obvious for a person skilled in the art that a business plan design apparatus can be derived that simulates and outputs a sales quantity of a specific product, makes

a production plan of the specific product based on the output sales quantity, using the above estimation model.

Therefore, a "business plan design apparatus" in Claim 1 is disclosed in the description in a manner that a person skilled in the art can make and use the apparatus. In other words, the description provides a clear and sufficient disclosure for a person skilled in the art to carry out the invention.

[Case 48]

Title of the Invention

AUTONOMOUS VEHICLE

What is claimed is:

[Claim 1]

An autonomous vehicle having a driver monitoring device,

the driver monitoring device including:

an image obtainment unit that obtains an image taken by an imaging device that has been positioned so as to take an image of a driver seated in a vehicle seat; and

a quick reaction capability estimation unit that inputs the taken image to a trained learning device and obtains a quick reaction capability score representing a quick reaction capability of the driver during vehicle operation from the trained learning device, the trained learning device having been trained through machine leaning to estimate a quick reaction capability of the driver during vehicle operation,

wherein switching from an autonomous operation mode in which a vehicle is operated automatically to a manual operation mode in which a vehicle is operated manually by a driver is prohibited, in a case where the obtained quick reaction capability score does not satisfy a predetermined condition.

Overview of the Description

An autonomous vehicle having a driver monitoring device of the present invention is configured in a manner that an operation mode can selectively be switched between an autonomous operation mode in which a vehicle is operated automatically and a manual operation mode in which a vehicle is operated manually by a driver. During an operation in an autonomous operation mode, switching from the autonomous operation mode to the manual operation mode is prohibited in a case where a quick reaction capability of the driver to vehicle operation does not satisfy a predetermined condition. The quick reaction capability of the driver is represented by a quick reaction capability score that is obtained by the driver monitoring device. With this configuration, it is possible to provide a vehicle in which switching an operation mode from an autonomous operation mode to a manual operation mode is allowed only when it is appropriate to do so, based on the quick reaction capability of a driver.

The driver monitoring device obtains a quick reaction capability score from a learning model that outputs the quick reaction capability score in response to an input of an image of a driver seated in a vehicle seat. The learning model is generated using a known machine learning algorithm such as a neural network. A training data that is input to the machine learning algorithm can be generated by associating a quick reaction capability score with each of images of a driver seated in a vehicle seat in various situations. The images of a driver are taken by a camera, for example, that is positioned so as to take an image of a driver seated in a vehicle seat.

The quick reaction capability score in this case is a numeric parameter between 0 to 10. Each of the images of a driver in various types of behavior is manually evaluated based on c, and then a quick reaction capability score is set for each of the images. For example, when a driver is "holding a steering wheel," "operating a meter," "operating a navigation system" or the like, it is determined that the driver is ready for vehicle operation and a high numeric parameter is assigned to the image. Meanwhile, when a driver is "chatting," "smoking," "eating," "talking on the phone," "using a cell phone," or the like, it is determined that the driver is not ready for vehicle operation and a low numeric parameter is assigned to the image. The quick reaction capability score may differently be assigned depending on each specific situation, even for a similar behavior. For example, the quick reaction capability score may differently be assigned for "holding a steering wheel" or "chatting" depending on a driver's face direction, face expression, or the like. Similarly, the quick reaction capability score may differently be assigned for "eating" depending on a food.

Note:

In this case, it is assumed that, in view of a common general technical knowledge at the time of filing, a person skilled in the art can presume a certain relation such as a correlation (hereinafter, referred to as a "correlation or the like" in this Case Example) between a driver's behavior that has been taken in an image and a quick reaction capability to vehicle operation.

[Overview of Reason for Refusal]

There is no reason for refusal is found.

Notes

- Article 36(4)(i) (Enablement Requirement)

The description discloses (i) using multiple images of a driver seated in a vehicle seat that have been taken by a camera positioned so as to take images of the driver in various behaviors and (ii) using a quick reaction capability score based on numeric parameters that have manually been assigned to the taken images.

Further, the description discloses examples of a driver's behavior in an image and a corresponding numeric parameter. It can be presumed that, in view of a common general technical knowledge at the time of filing, there is a correlation or the like between a driver's behavior seen in an image and a quick reaction capability of the driver.

It is also a common general technical knowledge for a person skilled in the art at the time of filing that an estimation model can be generated that estimates an output in response to an input through machine learning with a training data containing an input data and output data having a correlation or the like with each other, using a generally-used machine learning algorithm.

In view of the above, a learning model can be generated using a universal machine learning algorithm with a training data containing images of a driver and numeric parameters that

have manually been assigned to the images through evaluation on each image. Accordingly, it is obvious for a person skilled in the art that an autonomous vehicle can be derived that (i) obtains a quick reaction capability score representing a quick reaction capability of the driver during vehicle operation from the above-mentioned learning model, and (ii) prohibits switching from an autonomous operation mode in which a vehicle is operated automatically to a manual operation mode in which a vehicle is operated manually by a driver, in a case where the obtained quick reaction capability score does not satisfy a predetermined condition.

Therefore, an "autonomous vehicle" in Claim 1 is disclosed in the description in a manner that a person skilled in the art can make and use the vehicle. In other words, the description provides a clear and sufficient disclosure for a person skilled in the art to carry out the invention.

[Case 49]

Title of the Invention

BODY WEIGHT ESTIMATION SYSTEM

What is claimed is:

[Claim 1]

A body weight estimation system comprising:

a model generation means for generating an estimation model that estimates a body weight of a person based on a feature value representing a face shape and a body height of the person, through machine learning using training data containing feature values representing face images as well as actual measured values of body heights and body weights of people;

a reception means for receiving an input of a face image and body height of a person;

a feature value obtainment means for obtaining a feature value representing a face shape of the person through analysis of the face image of the person that has been received by the reception means; and

a processing means for outputting an estimated value of a body weight of the person based on the feature value representing the face shape of the person that has been received by the feature value obtainment means and the body height of the person that has been received by the reception means, using the generated estimation model by the model generation means.

[Claim 2]

The body weight estimation system as in Claim 1, wherein the feature value representing a face shape is a face-outline angle.

Overview of the Description

It is an object of the present invention to provide a body weight estimation system that can conveniently be used outside without a body weight scale.

There is a certain degree of correlation between a face feature and physical size of a person. As seen in Fig. 1, the inventor found a statistically significant correlation between a cosine of a face-outline angle and BMI (defined as a body weight divided by the square of a body height) of a person. The face-outline angle here means an angle defined between a tangent line to a jaw and a tangent line to a cheek. As seen in Fig. 2, data plots can be approximated by a linear function in the coordinate system in which the horizontal axis represents BMI and the vertical axis represents a cosine of a face-outline angle.

This suggests a certain degree of correlation between a body height and weight used for BMI calculation and a face-outline angle. Accordingly, an estimation model with a highly accurate output can be generated through machine learning, using a known machine learning algorithm such as a neural network with a training data. The training data contains actual measured values of face-outline angles, body heights, and body weights. The face-outline

angles are obtained through analysis on face images of people.

A feature value representing a face shape of a person is a face-outline angle in this embodiment, but it is not limited to this. Any feature value representing a face shape may be obtained from a face image and used.

Note:

In this case, it is assumed that, even in view of a common general technical knowledge at the time of filing, a person skilled in the art can presume a certain relation such as a correlation (referred to as "correlation or the like" in this Case Example) between (i) a body height, weight, and the like of a person and BMI based on these and (ii) a feature representing a face shape such as a face-outline angle is not a common general technical knowledge at the time of filing here.

Figures

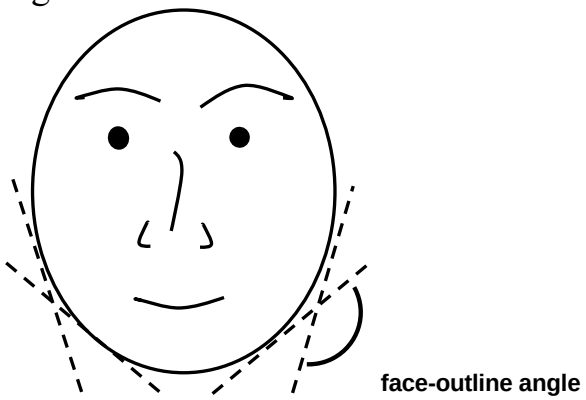


Fig. 1

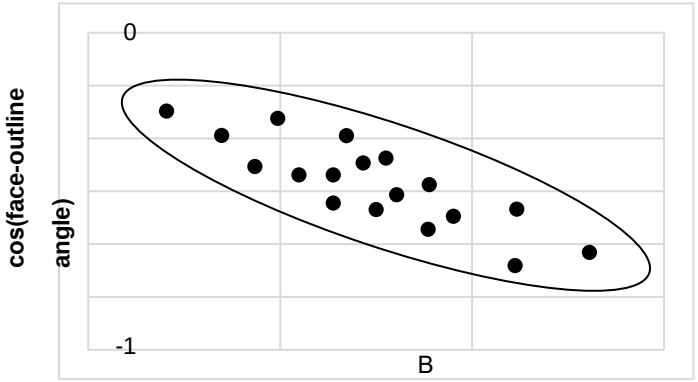


Fig. 2

Overview of Reason for Refusal

- Claim 1: Article 36(6)(i) (Support Requirement)/Article 36(4)(i) (Enablement Requirement)
- Claim 2: There is no reason for refusal found.

- Article 36(6)(i) (Support Requirement)/Article 36(4)(i) (Enablement Requirement): Claim 1

The description discloses that (i) a feature value representing a face shape of a person is a face-outline angle, which is defined between a tangent line to a jaw and a tangent line to a cheek, and (ii) there is a statistically significant correlation between a cosine of a face-outline angle and BMI (defined as a body weight divided by the square of a body height) of a person.

However, the description only discloses that any feature value other than a face-outline angle representing a face shape may be obtained from a face image and used. It does not disclose a correlation or the like between (i) a feature value other than a face-outline angle representing a face shape and (ii) a body height, weight, and the like of a person and BMI based on these. Further, it cannot be presumed that there is such a correlation or the like even if a common general technical knowledge at the time of filing is taken into consideration. There is

no performance evaluation result disclosed on an estimation model that has actually been generated using a feature value other than a face-outline angle representing a face shape.

Accordingly, the description does not provide a sufficient disclosure for a person skilled in the art to recognize that a body weight estimation can be attained based on a body height and any feature value representing a face shape. In other words, the scope of the description cannot be expanded or generalized to that of the invention of Claim 1, in which an input to an estimation model that outputs an estimation value of a body weight is specified only by a body height and a feature value representing a face shape in a face image of a person.

Thus, the scope of the invention of Claim 1 exceeds that of the description.

In view of the disclosure in the description and a common general technical knowledge at the time of filing as explained above, it does not seem that a person skilled in the art can make a body weight estimation system that estimates a body weight of a person in response to an input of a body height and a feature value representing a face shape of a person, by generating an estimation model using a universal machine learning algorithm with a training data containing actual measured values of body weights, body heights, and feature values representing face shapes of people.

Therefore, a "body weight estimation system" in Claim 1 is not disclosed in the description in a manner that a person skilled in the art can make and use the system. In other words, the description does not provide a clear and sufficient disclosure for a person skilled in the art to carry out the invention.

Notes

Claim 2

The description discloses that there is a statistically significant correlation between a cosine of a face-outline angle and BMI of a person.

Based on the disclosure in the description, a person skilled in the art can recognize that there is a certain degree of correlation between a body height and weight and a face-outline angle, and can generate an estimation model using a universal machine learning algorithm with a training data containing actual measured values of body heights, body weights, and face-outline angles. Accordingly, a body weight estimation system can be made that estimates a body weight of a person in response to an input of a face-outline angle and a body height of a person, using the above estimation model.

Therefore, the description discloses a "body weight estimation system" in Claim 2 in a manner that a person skilled in the art can make and use the system. In other words, the description provides a clear and sufficient disclosure for a person skilled in the art to carry out the invention.

Further, the invention of Claim 2 is disclosed in the description and Claim 2 satisfies the support requirement.

Measures to be Taken by the Applicant

The applicant can overcome the reason for refusal by an amendment deleting Claim 1 and leaving only Claim 2.

[Case 50]

Title of the Invention

METHOD FOR ESTIMATING ALLERGY INCIDENCE RATE OF TEST SUBSTANCE

What is claimed is:

[Claim 1]

A method for estimating an allergy incidence rate of a test substance in a human being comprising:

inputting a training data to an artificial intelligence model to train the model, the training data including a group of data representing a shape change of a human X cell in culture solution and a scoring data on incidence rates of human allergic reaction caused by each substance, in which each of the substances is separately added to the culture solution and the incidence rates of human allergic reaction caused by each of the substances are already known;

obtaining a group of data representing a shape change of a human X cell that has been measured in culture solution to which a test substance is added;

inputting, to the trained artificial intelligence model, the group of data representing a shape change of a human X cell that has been measured in the culture solution to which the test substance is added; and

causing the trained artificial intelligence model to calculate a scoring data of an incidence rate of human allergic reaction.

[Claim 2]

The method for estimating an allergy incidence rate as in Claim 1, wherein the group of data representing a shape change of a human X cell is a combination of a shape change in an ellipticity, rugosity, and oblateness of the human X cell; and the allergic reaction is contact dermatitis.

Overview of the Description

The present invention relates to a method for estimating an allergy incidence rate of a test substance in a human being, using a trained artificial intelligence model. It is an object of the invention to prevent loss in selecting a candidate substance, through an estimation of an incidence rate of human allergic reaction of a test substance at an early stage in selecting a candidate substance.

An embodiment discloses an experimental result verified by (i) adding each of candidate substances, of which contact dermatitis incidence rate is known, is separately added to culture solution for a human X cell, (ii) obtaining a group of data representing a shape change of a human X cell in the culture solution in an ellipticity, rugosity, and oblateness between before and after the addition; inputting, to a universal artificial intelligence model, a training data to train the

model including the above-mentioned 3 types of data in the shape change and a scoring data on incidence rates of contact dermatitis caused by each of the substances so as to train the model; each of substances that has not been used for the training of the artificial intelligence model, of which contact dermatitis incidence rate is known, is separately added to culture solution for a human X cell; obtaining a group of data representing a shape change of a human X cell in the culture solution in an ellipticity, rugosity, and oblateness between before and after the addition; inputting the obtained group of data to the trained artificial intelligence model; and calculating a scoring data on contact dermatitis incidence rates that is estimated by the artificial intelligence. The experimental result shows that, for ○% or more of the candidate substances, the difference between the estimated score and the actual score was equal to or less than ○%.

Note:

In this case, it is assumed that, even in view of a common general technical knowledge at the time of filing, a person skilled in the art can presume a certain relation such as a correlation (hereinafter, referred to as a "correlation or the like") between an allergy incidence rate and a shape change of a cell.

[Overview of Reason for Refusal]

- Claim 1: Article 36(6)(i)(support requirement) / Article 36(4)(i)(enablement requirement)
- Claim 2: None

Claim 1: Article 36(6)(i) (support requirement) / Article 36(4)(i) (enablement requirement)

Claim 1 discloses a method for estimating an allergy incidence rate that is specified only by a training data including a group of data representing a shape change of a human X cell and a scoring data on incidence rates of human allergic reaction. The description only discloses some specific examples of training data that could be used for an incidence rate estimation of allergic reaction, namely, a combination of an ellipticity, rugosity, and oblateness of a human X cell, and a scoring data on incidence rates of contact dermatitis.

A shape change of a human X cell can be represented by various parameters in addition to the ellipticity, rugosity, and oblateness. However, it is difficult to know the parameters that lead to an incidence rate estimation of allergic reaction other than the combination of these three factors, because it is difficult to presume a correlation or the like between an allergic reaction incidence rate and a cell shape change even if a common general technical knowledge at the time of filing of the present invention is taken into consideration. Meanwhile, it is a common general technical knowledge that an antibody or cell associated with allergic reaction and a development mechanism varies among many types of allergic reaction including contact dermatitis. Accordingly, there is no reasonable ground to consider that an incidence rate of a different type of allergic reaction can also be estimated.

It is not possible to find a ground to expand or generalize the disclosed matters in the description to the scope of the invention as in Claim 1, in which an input to an artificial intelligence model that calculates a scoring data of incidence rates of allergic reaction is specified only by a group of data representing a shape change of a human X cell and a scoring data on incidence rates of allergic reaction.

Thus, the scope of the invention as in Claim 1 exceeds the scope disclosed in the description.

In view of the disclosure in the description and the common general technical knowledge at the time of filing, it does not seem that the invention is sufficiently disclosed for a person skilled in the art to recognize that an allergic reaction incidence rate can be estimated through a method for estimating an allergy incidence rate, which uses a training data including a group of data representing a shape change of a human X cell other than the combination of a shape change in an ellipticity, rugosity, and oblateness, and a scoring data on known incidence rates of human allergic reaction other than contact dermatitis.

Therefore, the description does not provide a clear and sufficient disclosure of the invention of a "method for estimating an allergy incidence rate of a test substance in a human being" as in Claim 1 in a manner that a person skilled in the art can carry out the invention.

Notes

Claim 2

The description discloses that inputting, to an artificial intelligence model to train the model, a training data including: a group of data representing a known shape change of a human X cell in each known substance, with which known incidence rates of contact dermatitis is associated, respectively, containing a combination of the ellipticity, rugosity, and oblateness; and a scoring data on the known incidence rates of human contact dermatitis for each of the known substances. Further, the description discloses the fact that the trained artificial intelligence model could actually estimate an incidence rate of contact dermatitis with a certain accuracy, using data that had not been used to train the artificial intelligence model.

Thus, the description provides a clear and sufficient disclosure of the invention as in Claim 2, which is a method for estimating a contact dermatitis incidence rate of a test substance in a human being using an artificial intelligence model, in a manner that a person skilled in the art can carry out the invention. In other words, the description satisfies the enablement requirement for Claim 2.

In view of the disclosure in the description and the common general technical knowledge at the time of filing, it seems that the description provide a sufficient disclosure for a person skilled in the art to recognize that an object of the present invention to estimate a contact dermatitis incidence rate of a test substance in a human being can be attained.

Therefore, the invention as in Claim 2 is sufficiently disclosed in the description and thus satisfies the support requirement.

Measures to be taken by the Applicant

The applicant can overcome the reason for refusal by an amendment deleting Claim 1 and leaving only Claim 2.

[Case 51]

Title of the Invention

ANAEROBIC ADHESIVE COMPOSITION

What is claimed is:

[Claim 1]

An anaerobic adhesive composition comprising:

a 0.08 - 3.2 mass % compound A,

a 0.001 - 1 mass % compound B, and

a residue containing an anaerobically curable (meth)acrylate monomer,

wherein the anaerobic adhesive composition shows the curing strength equal to or exceeding 30 % of the curing strength after 24 hours have passed, within 5 minutes from the start of curing.

Overview of the Description

Conventionally, various combinations of a free radical initiator and a free radical reducing agent have been used for a curing system to enhance the cure rate of an anaerobic adhesive composition. Nevertheless, any optimal combination has not been found among numerous combinations, which realizes the curing strength equal to or exceeding 30 % of the curing strength after 24 hours have passed, within 5 minutes from the start of curing.

It is an object of the present invention to provide an anaerobic adhesive composition with an optimal component that shows the curing strength equal to or exceeding 30 % of the curing strength after 24 hours have passed, within 5 minutes from the start of curing.

In an embodiment, in order to derive an anaerobic adhesive composition attaining such an object, a conventionally known component data of an anaerobic adhesive composition, a curing strength data within 5 minutes from the start of curing, and a curing strength data after 24 hours have passed were input to a neural network; and then a trained model was prepared in a manner that a component of the anaerobic adhesive composition and a ratio between the curing strength within 5 minutes from the start of curing and the curing strength after 24 hours have passed were associated with each other. Further, an estimation result is disclosed showing the possibility where an anaerobic adhesive composition containing an anaerobically curable (meth)acrylate monomer can be obtained using the trained model, which realizes the curing strength equal to or exceeding 30% of the curing strength after 24 hours have passed within 5 minutes from the start of curing, by adding a 0.08 - 3.2 mass % compound A and a 0.001 - 1 mass % compound B in combination.

Notes

The description does not disclose any embodiment in which an anaerobic adhesive composition is actually produced within the above combination ratio and then the curing strength

is measured. Further, there is no verification shown on the estimation accuracy of the trained model. Furthermore, it is not known that the curing strength is enhanced within 5 minutes after the start of curing, by adding any one of a compound A, a compound B, and the combination thereof. Meanwhile, a measurement method and condition are specifically disclosed to measure the curing strength within 5 minutes after the start of curing and the curing strength after 24 hours have passed.

It is assumed that it is a common general technical knowledge at the time of filing that it is difficult to control an anaerobic adhesive composition so as to rapidly raise the curing temperature within 5 minutes or so after the start of curing, and that various conditions for production such as a type, combination, or combination ratio of polymer material, free radical initiator, or free radical reducing agent closely interact with each other. Meanwhile, it is not assumed that it is a common general technical knowledge at the time of filing that an estimation result by a trained model can be a substitution for an actual experimental result.

Overview of Reason for Refusal

・ Claim 1: Article 36(4)(i) (enablement requirement) / Article 36(6)(i) (support requirement)

It is the common technical knowledge at the time of filing that it is difficult to control an anaerobic adhesive composition so as to rapidly raise the curing temperature within 5 minutes or so after the start of curing, and that various conditions for production such as a type, combination, or combination ratio of polymer material, free radical initiator, or free radical reducing agent closely interact with each other.

The description only discloses that a trained model predicted that, as long as a composition meets the combination ratio prescribed in Claim 1, the composition has the curing strength equal to or exceeding 30% of the curing strength after 24 hours have passed, within 5 minutes from the start of curing. Further, the accuracy of an estimation value by the trained model is not verified, and there was no such a common technical knowledge at the time of filing that an estimation result by a trained model can be a substitution for an actual experimental result.

Any embodiment is not disclosed supporting the fact that the claimed composition shows the curing strength equal to or exceeding 30 % of the curing strength after 24 hours have passed within 5 minutes from the start of curing, by actually producing a composition including a 0.08 - 3.2 mass % compound A, a 0.001 - 1 mass % compound B, and a residue containing an anaerobically curable (meth)acrylate monomer, and then measuring the curing strength.

Thus, it does not seem that the description provide a sufficient disclosure of the invention in a manner that a person skilled in the art can produce the anaerobic adhesive composition as in Claim 1 that shows the curing strength equal to or exceeding 30 % of the curing strength after 24 hours have passed, within 5 minutes from the start of curing.

Therefore, the description does not provide a clear and sufficient disclosure so as to enable a person skilled in the art to carry out the invention as in Claim 1, in which an anaerobic adhesive composition comprises a 0.08 - 3.2 mass % compound A, a 0.001 - 1 mass % compound

B, and a residue containing an anaerobically curable (meth)acrylate monomer, and the curing strength of the composition is equal to or exceeds 30% of the curing strength after 24 hours have passed, within 5 minutes from the start of curing.

Claim 1 discloses an invention of an anaerobic adhesive composition comprising a 0.08 - 3.2 mass % compound A, a 0.001 - 1 mass % compound B, and a residue containing an anaerobically curable (meth)acrylate monomer, in which the curing strength of the composition is equal to or exceeds 30% of the curing strength after 24 hours have passed, within 5 minutes from the start of curing. Meanwhile, in view of the disclosure in the description and the common general technical knowledge at the time of filing, the description does not provide a sufficient disclosure so as to enable a person skilled in the art to recognize that an object of the present invention to provide an anaerobic adhesive composition showing the curing strength equal to or exceeding 30 % of the curing strength after 24 hours have passed within 5 minutes from the start of curing can be attained.

Therefore, the invention as in Claim 1 is not disclosed in the description.

Measures to be taken by the Applicant

Even if the common general technical knowledge is taken into consideration, the description does not provide a sufficient disclosure for a person skilled in the art to recognize that an object of the present invention to provide an anaerobic adhesive composition showing the curing strength equal to or exceeding 30% of the curing strength after 24 hours have passed within 5 minutes from the start of curing can be attained. Further, the description does not provide a clear and sufficient disclosure for such a person to carry out the invention.

Therefore, the insufficient disclosure in the description cannot be overcome and accordingly, the reasons for refusal cannot be overcome, even if the applicant actually produces, after the filing of the present invention, an anaerobic adhesive composition as in Claim 1 and then submits a certificate of experimental results that supports the estimation by the trained model to make an argument that an object of the invention can be attained.

[Case 52]

Title of Invention

Fluorescent Compound

What is claimed is:

[Claim 1]

A fluorescent compound having luminescence properties with an emission peak wavelength equal to or greater than 540 nm and equal to or less than 560 nm and a fluorescence lifetime equal to or greater than 5 μs and equal to or less than 20 μs.

[Claim 2]

The fluorescent compound according to claim 1, wherein the compound is compound A.

[Claim 3]

The fluorescent compound according to claim 1, wherein the compound is compound B.

Overview of the description

Fluorescent compounds are used for light emitting materials of organic EL elements or the like, and various compounds having different chemical structures are known, but one having luminescence properties with an emission peak wavelength equal to or greater than 540 nm and equal to or less than 560 nm and a fluorescence lifetime equal to or greater than 5 μs and equal to or less than 20 μs is not known. The present invention is intended to provide fluorescent compounds with the luminescence properties using machine learning techniques.

The following example 1 describes machine learning.

Example 1: Machine learning was performed using data on the chemical structures of known fluorescent compounds and their luminescence properties as learning data to create a trained model capable of predicting chemical structures from luminescence properties. The above trained model was used to predict the chemical structures of fluorescent compounds having luminescence properties with an emission peak wavelength equal to or greater than 540 nm and equal to or less than 560 nm and a fluorescence lifetime equal to or greater than 5 μs and equal to or less than 20 μs, and then compounds A and B with novel chemical structures were predicted.

The following Example 2 describes compounds predicted by machine learning.

Example 2: A method for producing compound A was provided and compound A was produced according to the method.

The luminescence properties of compound A were measured and the emission peak wavelength was 545 nm and the fluorescence lifetime was 12 μs.

(2024.3)

(The applicant argues that the detailed description of the invention specifically states the method for producing and using the machine learning model (Example 1), and the estimation accuracy of the machine learning model is also verified using compounds that were actually produced (Example 2), therefore, a person skilled in the art can produce and use the machine learning model and implement the invention to predict the chemical structure of a fluorescent compound whose emission peak wavelength is equal to or greater than 540 nm and equal to or less than 560 nm and whose fluorescence lifetime is equal to or greater than 5 μs and equal to or less than 20 μs, not limited to compound A. The applicant also argues that compound B can be as effective as compound A because it uses the above model, which has been validated for its estimation accuracy.)

Note:

For compound inventions, in general, it is common general technical knowledge as of the filing that it is relatively difficult to understand how a compound is produced and what kind of activity it has from information about the chemical structural formula. In addition, in the technical field of compounds, it is not common general technical knowledge at the time of filing that an estimation result by a trained model can be a substitution for an actual experimental result.

Then, the chemical structure of compound B is not similar to the chemical structures of compound A and other known compounds, and it is difficult to infer the production method and luminescence properties of compound B from the production methods and luminescence properties of these compounds.

[Overview of Reason for Refusal]

・Claims 1 and 3: Article 36(4)(i) (Enablement Requirement) / Article 36(6)(i) (Support Requirement)

・Claim 2: There is no reason for refusal found.

In Example 2 of the present application, the chemical structure of compound A is shown as a fluorescent compound having luminescence properties (hereinafter, the target luminescence properties) with an emission peak wavelength equal to or greater than 540 nm and equal to or less than 560 nm and a fluorescence lifetime equal to or greater than 5 μs and equal to or less than 20 μs, and a specific example is stated in which the compound was actually produced and confirmed to have the above target luminescence properties.

In addition, Example 1 of the present application states that the chemical structure of compounds with the above target luminescence properties can be predicted [illegible] (2024.3) model, not limited to compound A.

However, for compound inventions in general, it is common general technical knowledge at the time of filing that it is relatively difficult to understand what kind of activity a compound has from information about the chemical structural formula, and there was no such common technical knowledge at the time of filing that an estimation result by a trained model can be a substitution for an actual experimental result, and the detailed description of the invention does not verify that the trained model of the present application can predict luminescence properties with high accuracy for compounds other than compound A. Ultimately, the luminescence properties of any compound are unknown unless the luminescence properties are actually measured, and even a person skilled in the art cannot understand whether or not the above predicted compounds other than compound A have the above target luminescence properties, and therefore, with respect to other than compound A, the statement of the description of the invention cannot be deemed to be informative enough to implement the invention of compounds having the above target luminescence properties.

Even if the predicted compounds other than compound A have the target luminescence properties, the methods for producing the compounds with the target luminescence properties other than compound A are not stated in the description, and compound inventions generally belong to the technical field where it is relatively difficult to produce a compound from information about the chemical structural formula. Therefore, it is not considered that a person skilled in the art can produce the compound even if the production method is not indicated in the description; even a person skilled in the art cannot understand the production method of the compound having the above target luminescence property other than compound A, and the production of the compound would require trials and errors and/or complicated and sophisticated experimentation beyond an extent to which a person skilled in the art should be reasonably expected to make.

Therefore, with respect to the inventions of claims 1 and 3, the detailed description of the invention is not clearly and sufficiently stated so as to enable a person skilled in the art to carry out the invention.

As discussed above, even if the common general technical knowledge is taken into consideration, the detailed description of the invention does not state that a person skilled in the art can recognize that the problem of providing a fluorescent compound having the above target fluorescence properties can be solved for the entire fluorescent compound having luminescence properties with an emission peak wavelength of 540 nm or more and 560 nm or less and a fluorescence lifetime of 5 μs or more and 20 μs or less, and thus the conter (2024.3)
detailed explanation of the invention cannot be expanded or generalized to
claims 1 and 3.

Therefore, the inventions of claims 1 and 3 are not stated in the detailed description of the invention.

These cases explain the determination of the subject description requirements (enablement requirement and support requirement) and the measures of the applicant, but do not explain the determination of other requirements such as clarity, or the measures of the applicant.

In addition, the difficulty of specifically understanding a compound specified only by the target luminescence properties is common general technical knowledge at the time of filing. In view of this common general technical knowledge, it should also be noted that clarity is denied if it is clear that the chemical structure, etc., necessary to have the above properties is not specified and the "compound" specified only by the above properties is not sufficiently defined in technical terms (see (2) of Part II, Chapter 2, Section 3, 4.1.1 "Types of unclear inventions" in the Examination Guidelines).

[Remarks]

・Claim 2

The detailed description of the invention shows the method for producing compound A, and states that compound A was produced according to the method, and the luminescence properties of compound A were measured: the emission peak wavelength was 545 nm and the fluorescence lifetime was 12 μs (Example 2).

Thus, the detailed description of the invention clearly and sufficiently states the invention of claim 2 so as to enable a person skilled in the art to carry out the invention of claim 2, and the detailed description of the invention satisfies the enablement requirement with respect to claim 2.

In addition, the invention of claim 2 is stated in the detailed description of the invention, and claim 2 satisfies the support requirement.

[Measures of the applicant]

The insufficient disclosure in the detailed description of the invention cannot be overcome and accordingly, the reasons for refusal cannot be overcome, even if the applicant actually produces, after the filing of the present invention, the fluorescent compound of the invention of claim 3 and then submits a certificate of experimental results that supports the estimation by the trained model to make an argument that an object of the invention can be attained. (See Examination Guidelines, Part II, Chapter I, Section 1, Enablement Requirement, "4.2 Arguments and/or explanation, etc. by applicant".) The same applies to the invention includes claim 3. (2024.3)

Therefore, the applicant can overcome the reasons for refusal by deleting claims 1 and 3 and maintaining only claim 2.

(2024.3)

[Case 53]

Title of Invention

Method for Generating Images for Training Data

What is claimed is:

[Claim 1] (“The content of training data for machine learning” is limited, but not “the AI subject to machine learning”)

A method for generating composite images, comprising a step of obtaining radiological images including the human body and surgical instrument images indicating surgical instruments; and

a step of generating composite images by combining the surgical instrument images with the radiological images, performed by an image generation device.

[Claim 2] (“The AI subject to machine learning” is limited, but not “the content of the training data for machine learning”)

A method for generating images for training data for training a discriminator that determines the area of surgical instruments in target images when the target images are input,

the method comprising a step of obtaining a first image and a second image which are radiological images;

and a step of generating images for training data corresponding to the target images by combining the second image with the first image, performed by an image generation device for training data.

[Claim 3] (Both “the content of training data for machine learning” and “the AI subject to machine learning” are limited)

A method for generating images for training data for training a discriminator that determines the area of surgical instruments in target images when the target images are input,

the method comprising a step of obtaining radiological images including the human body and surgical instrument images indicating surgical instruments;

and a step of generating images for training data corresponding to the target images by combining the surgical instrument images with the radiological images, performed by an image generation device for training data.

Overview of the description

[Technical field]

The invention relates to a method for creating images for training data for constructing a discriminator that determines the area of surgical instruments in input radiological images by machine learning.

[Background Art]

When performing surgical procedures on patients, various surgical instruments are used, such as gauze to control bleeding, sutures, and needles to close wounds or incisions. Such surgical instruments can cause serious complications if left in the patient's body after surgery. Therefore, it is necessary to ensure that no surgical instruments remain in the patient's body after surgery.

Conventionally, radiological images are taken of the patient after surgery, and the surgeon or nurse visually checks to see if gauze or other surgical instruments remain in the patient's body.

However, after a long surgery, both the surgeon and the nurses are tired and may miss the surgical instruments left behind.

Therefore, in order to assist surgeons and nurses, it was desired to construct a discriminator to which radiological images of patients are input to automatically determine the area of surgical instruments in the input radiological images.

[Problems to be Solved by the Invention]

A large amount of training data must be collected to create a discriminator as described above by machine learning, but actual radiological images in which surgical instruments such as gauze remain in the patient's body are extremely rare, making it difficult to collect a large amount of training data.

The present invention has been conceived in view of such situation and aims to easily create a sufficient number of images for training data to train a discriminator that determines the area of surgical instruments in input radiological images including the human body.

[Means for Solving the Problem]

In the present invention, the images for training data T0 for training the above discriminator are generated by obtaining radiological images G0 including the human body and surgical instrument images M0 indicating surgical instruments, and combining the obtained radiological images G0 and surgical instrument images M0.

[Effect of Invention]

A sufficient number of images for training data T0 can be easily prepared to train the above discriminator, and as a result, a discriminator with high detection accuracy of surgical instruments can be constructed.

[Mode for carrying out the invention]

The image processing device of the present invention comprises an image acquisition unit, a composition unit, a learning unit, a detection unit, and a display control unit.

The image acquisition unit obtains radiological images G0, including any subject, from an image storage system via the I/F network to generate images for training data T0.

The image acquisition unit also obtains surgical instrument images M0 indicating surgical instruments from the image storage system to generate the images for trai

surgical instrument image M0 is, for example, a three-dimensional image that indicates surgical instruments and is created using computer graphics or the like.

When target radiological images G1 are input, the composition unit combines the radiological images G0 and the surgical instrument images M0, thereby generating images for training data T0 for training a discriminator that determines the area of surgical instruments in the radiological images G1. The composition unit combines the radiological images G0 and the surgical instrument images M0 to generate the images for training data T0.

The composition unit also generates a plurality of images for training data T0 by combining the surgical instrument images M0, whose position, angle and size are modified, with the radiological images G0 for training the discriminator described below. This generates images for training data T0, in which the surgical instrument images M0 are combined with the radiological images G0 as if they were radiographed.

The learning unit trains the discriminator to determine the area of surgical instruments in the input radiological images using the training data including the images for training data T0 and the correct data in which the area of surgical instruments in the images for training data T0 is identified, and the training data consisting of the radiological images without surgical instruments. A sufficient number of images are prepared as training data for machine learning.

As a discriminator, machine learning models can be used. Examples of machine learning models include a neural network model. A convolutional neural network is used as the discriminator in the embodiment.

The discriminator is trained to output, when the images for training data T0 contained in the training data are input, the probability that each pixel in the images for training data T0 is the area of surgical instruments.

The trained discriminator is applied to the detection unit. When the target radiological images G1 are input to the detection unit, the discriminator extracts the area of surgical instruments contained in the radiological images G1 to be detected to detect the area of surgical instruments.

The display control unit shows the radiological images G1 on the display, highlighting the area of surgical instruments detected by the detection unit from the radiological images G1 to be detected.

Any surgical instrument used in surgery, such as suture needles, gauze, scalpels, scissors, drains, sutures, forceps, and stent grafts, may be subject to surgical instrument detection.

[Overview of Reason for Refusal]
Claim 1-2: Article 36(6)(i) (Support requirement)
Claim 3: There is no reason for refusal found.

The problem stated in the detailed description of the invention is merel (2024.3)
sufficient number of images for training data to train a discriminator to det
surgical instruments in input radiological images including the human body. The detailed description of the invention states that “images for training data are created by combining

radiological images including the human body and surgical instrument images indicating surgical instruments" to "use the images for training data for training a discriminator that determines the area of surgical instruments in the input radiological images" as a means to solve the problem.

However, claim 1 merely states the content of the images to be combined (combining radiological images including the human body and surgical instrument images indicating surgical instruments) and does not specify in any way that the resulting combined images are used to train the discriminator, and thus does not reflect the means for solving the problem of the invention.

Furthermore, while claim 2 states that the combined images for training data are used to train the discriminator, it does not specify the content of the images combined to create the images for training data. For example, it is clear that the problem of the invention of "easily creating a sufficient number of images for training data to train a discriminator that determines the area of surgical instruments in input radiological images including the human body" can only be solved by a method of combining radiological images including the human body and surgical instrument images, and thus the means for solving the problem of the invention is not reflected.

Thus, the inventions of claims 1-2 exceed the scope stated in the detailed description of the invention.

[Remarks]

Claim 3

Claim 3 specifies that "images for training data are generated by combining radiological images including the human body and surgical instrument images indicating surgical instruments" to "use the images for training data to train the discriminator that determines the area of surgical instruments in the input radiological images" and thus reflects the means for solving the problem of the invention.

Therefore, the invention of claim 3 is stated in the detailed description of the invention, and claim 3 satisfies the support requirement.

(2024.3)

[Case 54]

Title of Invention

Screw Clamping Quality Estimation Apparatus

What is claimed is:

[Claim 1]

A machine learning apparatus for training a neural network through machine learning,

comprising a machine learning unit that trains a neural network through machine learning by associating a rotation speed of a screwdriver, an angular acceleration of the screwdriver, a position of the screwdriver, an inclination of the screwdriver, and the screw clamping quality clamped by the screwdriver.

[Claim 2]

A machine learning apparatus for training a neural network through machine learning,

comprising a machine learning unit that trains a neural network through machine learning by associating a rotation speed of a screwdriver, an angular acceleration of the screwdriver, a position of the screwdriver, and an inclination of the screwdriver as input data with the screw clamping quality clamped by the screwdriver as output data.

Overview of the description

A product that has been assembled through automatic screw clamping operation, carried out by means of a screwdriver is conventionally inspected by an operator to check whether a screw clamping quality meets a predetermined standard. However, this inspection burden the operator with a load and is a bottleneck for the whole process.

Inventors of the present invention found that a behavior of a screwdriver used in automatic screw clamping operation affects a screw clamping quality. In view of this, it is an object of the present invention to achieve a time-saving quality inspection by estimating a screw clamping quality based on a behavior of a screwdriver.

In the present invention, firstly a set of state variables is obtained by measuring a combination of rotation speed, angular acceleration, position, and inclination of a screwdriver used in an automatic screw clamping operation. Next, assessment results by an operator is obtained as a screw clamping quality on a product that has been assembled through the automatic screw clamping operation. Then, a neural network is trained by using a training data including an input data of the set of state variables and an output data of a screw clamping quality at the time of the automatic screw clamping using the set of state variables. The screw clamping quality of a product is estimated through an input of rotation speed, angular acceleration, position, and inclination of the screwdriver at the time of automatic screw clamping operation. A product of which screw clamping quality does not meet a predetermined standard, if any, is sorted to go on to a re-inspection process of a screw clamping quality by an operator or disposal.

An apparatus of the present invention trains a neural network through machine learning to estimate a screw clamping quality of a product that has been assembled through an automatic screw clamping operation. Conventionally, an inspection by an operator is needed after an automatic screw clamping process, and it burdened an operator with a load. However, the trained neural network though machine learning can be used to estimate a screw clamping quality, allowing for a time-saving inspection.

[Note]

Although the detailed description of the invention does not state a specific correlation between "a rotation speed of a screwdriver," "an angular acceleration of the screwdriver," "a position of the screwdriver," and "an inclination of the screwdriver" with "a screw clamping quality," it can be presumed that there is a correlation between them in view of a common general technical knowledge at the time of filing.

[Overview of Reason for Refusal]

Claim 1: Article 36(6)(i) (Support requirement)

Claim 2: There is no reason for refusal found.

Article 36(6)(i) (Support requirement): Claim 1

The detailed description of the invention merely states that a neural network is trained through the machine learning by using training data having "rotation speed, angular acceleration, position and inclination of a screwdriver" as input data and "screw clamping quality" as output data when an automatic screw clamping operation is performed with the input data, to solve only the problem of achieving a time-saving inspection by estimating a screw clamping quality based on a behavior of the screwdriver.

However, claim 1 does not specify the training data used as input data and used as output data in machine learning, and it includes, for example, a case where a neural network is trained through machine learning using training data; "screw clamping quality" as input data and "rotation speed, angular acceleration, position and inclination of a screwdriver" as output data, and it is obvious that the problem to be solved by the invention cannot be solved in such a case.

Therefore, the means for solving the problem of the invention is not reflected, and thus the invention of claim 1 exceeds the scope stated in the detailed description of the invention.

[Remarks]

Claim 2

Claim 2 is described, including the point where a neural network is trained through machine learning by associating both "rotation speed, angular acceleration, position, and inclination of a screwdriver" as input data and "screw clamping quality" as output data when an automatic screw clamping operation is performed with the above input data.

(2024.3)

Therefore, although the detailed description of the invention does not state a specific correlation between “a rotation speed of a screwdriver,” “an angular acceleration of the screwdriver,” “a position of the screwdriver,” and “an inclination of the screwdriver” with “a screw clamping quality,” it can be presumed that there is a correlation between them in view of a common general technical knowledge at the time of filing, and thus the detailed description of the invention can be regarded as disclosing the invention in such a way that a person skilled in the art could recognize that the problem of achieving a time-saving inspection can be solved by the invention of claim 2 by estimating a screw clamping quality based on a behavior of the screwdriver.

Thus, the invention of claim 2 is stated in the detailed description of the invention, and it satisfies the support requirement.

[Measures of the applicant]

The applicant can overcome the reasons for refusal by deleting claim 1 and maintaining only claim 2.

(2024.3)

[Case 55]

Title of Invention

Trained Model to Output Content of Work to be Performed in Response to Malfunction

What is claimed is:

[Claim 1](Invention that is subject to a reason for refusal based on a violation of the clarity requirement that the category of the invention is unclear.)

A trained model for estimating a content of a work to be performed in response to a malfunction that has occurred in a copier,

wherein a parameter of the trained model is trained using learning data that maps a malfunction code indicating the type of malfunction that has occurred in the copier and occurrence location information indicating the location where the malfunction occurred to label information indicating the content of the work performed by a maintenance manager of the copier for the malfunction,

the trained model receives, as input, the malfunction code indicating the type of malfunction that has occurred in the copier and the occurrence location information indicating the location where the malfunction occurred, and estimates the content of the work to be performed for the malfunction based on the parameter for the input malfunction code and the occurrence location information.

[Claim 2](Invention that is subject to a reason for refusal based on a violation of the clarity requirement in view of Example 2, 1.2.1.3 (1) in Annex B.)

A trained model for causing a computer to output a content of a work to be performed in response to a malfunction that has occurred in a copier,

wherein a parameter of the trained model is trained using learning data that maps a malfunction code indicating the type of malfunction that has occurred in the copier and occurrence location information indicating the location where the malfunction occurred to label information indicating the content of the work performed by a maintenance manager of the copier for the malfunction,

the trained model comprises means for receiving, as input, a malfunction code indicating the type of malfunction that has occurred in the copier and occurrence location information indicating the location where the malfunction occurred, means for calculating the input malfunction code and the occurrence location information based on the parameter, and means for outputting the content of the work to be performed for the malfunction.

[Claim 3](without a reason for refusal based on a violation of the clarity requirement)

A trained model for outputting a content of a work to be performed in response to a malfunction that has occurred in a copier,

wherein a parameter of the trained model is trained using learning data that maps a malfunction code indicating the type of malfunction that has occurred in the copier and occurrence location information indicating the location where the malfunction occurred to label information indicating the content of the work performed by a maintenance manager of the copier for the malfunction,

and the trained model causes a computer to receive, as input, a malfunction code indicating the type of malfunction that has occurred in the copier and occurrence location information indicating the location where the malfunction occurred, to calculate the input malfunction code and the occurrence location information based on the parameter, and to output the content of the work to be performed for the malfunction.

Overview of the description

[Background Art]

Copier malfunctions include paper jams, toner depletion, and component failure. Conventionally, when such a malfunction occurs in a copier, the maintenance manager of the copier takes action to resolve the malfunction, and it is difficult for the user of the copier to take appropriate action in response to the malfunction.

[Problems to be Solved by the Invention]

The present invention has been conceived in view of the above problem and aims to appropriately determine and output the content of the work to be performed in response to a malfunction that has occurred in a copier.

[Means for Solving the Problem]

The trained model of the present invention is used to estimate the content of the work to be performed in response to a malfunction that has occurred in a copier, and the trained model may be configured as a program module that is part of artificial intelligence software.

The learning device collects learning data, performs the learning process of the machine learning model based on the learning data, and generates a trained model. The learning data is data that maps a malfunction code indicating the type of malfunction, occurrence location information indicating the location where the malfunction occurred, and label information indicating the content of the work performed by the maintenance manager of the copier on the malfunction to the malfunctions that occurred in the past. The malfunction code is information that indicates the type of malfunction that has occurred in the copier, such as a paper jam, toner depletion, or component failure. The occurrence location information is information that indicates the location where the malfunction occurred, such as the tray of the copier, the printing unit, the reading unit, or the control unit. When a malfunction occurs in a copier, the maintenance manager of the copier confirms the type and location of the malfunction, and performs operations to correct the malfunction, such as removing paper, replacing toner, and replacing components. When the malfunction is corrected, the maintenance manager inputs the malfunction code indicating the

type of malfunction, the occurrence location information indicating the location where the malfunction occurred, and the label information indicating the content of the work performed for the malfunction into the learning device, and then the learning device correlates this input information and collects it as learning data.

The learning device that has collected the learning data learns the parameter of the machine learning model using a known supervised machine learning algorithm, such as a neural network, based on the learning data that maps the malfunction code and occurrence location information as input to the label information as output, and generates a trained model.

The computer incorporated in the copier comprises a CPU and a memory that stores the trained model trained by the learning device, and if the trained model is a program module, the trained model may be stored in the memory. In this case, when a new malfunction occurs in the copier, the computer performs the processing to output the content of the work to be performed for the malfunction according to commands from the trained model stored in the memory based on the malfunction code indicating the type of malfunction and the occurrence location information indicating the location where the malfunction occurred acquired by the malfunction detection sensor of the copier. Specifically, the trained model stored in the memory causes the computer to receive, as input, a malfunction code indicating the type of malfunction and occurrence location information indicating the location where the malfunction occurred, and when the received malfunction code and the occurrence location information are input, to calculate the input malfunction code and the occurrence location information based on a parameter, and to output the content of the work to be performed for the malfunction. The user of the copier can properly handle the copier's malfunction by, for example, performing the work according to the content of the work displayed on the copier's screen.

[Overview of Reason for Refusal]

Article 36(6)(ii) (Clarity Requirement): Claim 1

The trained model of claim 1 is not clear because it cannot be identified whether the invention is an “invention of a product” or an “invention of a method” and the category of the claimed invention is unclear.

(Supplementary Explanation)

Claim 1 does not state at all that the trained model causes the computer to perform multiple functions. The description also states that “the trained model may be configured as a program module that is part of artificial intelligence software” and “the computer incorporated in the copier comprises a CPU and a memory that stores the trained model trained by the learning device, and if the trained model is a program module, the trained model may be stored in the memory,” which describes that the trained model need not necessarily be a program, and even if the description in the drawings and the common general technical knowledge are taken into c
time of filing, it is not clear that the trained model of claim 1 is necessarily

(2024.3)

causes a computer to realize functions, and therefore it is not clear that the invention of claim 1 is an "invention of a product."

On the other hand, although claim 1 states a temporal method of "...receiving, as input, a malfunction code indicating the type of malfunction and occurrence location information" and "estimating the content of the work to be performed for the malfunction based on the parameter for the input malfunction code and the occurrence location information," a "trained model" comprising a "program" which is an "invention of a product" is described at the end of claim 1, and thus it is also not clear that the invention of claim 1 is an "invention of a method."

Therefore, it is not clear whether the trained model of claim 1 is an "invention of a product" or an "invention of a method".

Article 36(6)(ii) (Clarity Requirement): Claim 2

While the trained model according to claim 2 is "for causing a computer to output a content of a work to be performed in response to a malfunction that has occurred in a copier," the detailed description of the invention corresponds to "the trained model is used as a program module or part of a program module that is part of artificial intelligence software," "the computer incorporated in the copier comprises a CPU and a memory that stores the trained model trained by the learning device, and if the trained model is a program module, the trained model may be stored in the memory. In this case, when a new malfunction occurs in the copier, the computer performs the processing to output the content of the work to be performed for the malfunction according to commands from the trained model stored in the memory based on the malfunction code indicating the type of malfunction and the occurrence location information indicating the location where the malfunction occurred acquired by the malfunction detection sensor of the copier," and "specifically, the trained model stored in the memory causes the computer to receive, as input, a malfunction code indicating the type of malfunction and occurrence location information indicating the location where the malfunction occurred, and when the received malfunction code and the occurrence location information are input, to calculate the input malfunction code and the occurrence location information based on a parameter, and to output the content of the work to be performed for the malfunction," and in light of the above description, it is understood that the trained model of claim 2 is a "program" even though the claimed subject matter of claim 2 is described as a "model."

Therefore, in claim 2, it is understood that the "trained model" which is a program comprises "means for input", "means for calculation" and "means for output."

While a "program" causes a computer to function as means, the "program" itself does not function as the "means." Therefore, it is not possible that the "program" itse
functional means, and the claimed invention cannot be clearly understood. (2024.3)

[Remarks]
Claim 3

While the trained model according to claim 3 is for "causing a computer to receive, as input, a malfunction code indicating the type of malfunction that has occurred in the copier and occurrence location information indicating the location where the malfunction occurred, to calculate the input malfunction code and the occurrence location information based on the parameter, and to output the content of the work to be performed for the malfunction," the detailed description of the invention corresponds to "the trained model is used as a program module or part of a program module that is part of artificial intelligence software," "the computer incorporated in the copier comprises a CPU and a memory that stores the trained model trained by the learning device, and if the trained model is a program module, the trained model may be stored in the memory. In this case, when a new malfunction occurs in the copier, the computer performs the processing to output the content of the work to be performed for the malfunction according to commands from the trained model stored in the memory based on the malfunction code indicating the type of malfunction and the occurrence location information indicating the location where the malfunction occurred acquired by the malfunction detection sensor of the copier," and "specifically, the trained model stored in the memory causes the computer to receive, as input, a malfunction code indicating the type of malfunction and occurrence location information indicating the location where the malfunction occurred, and when the received malfunction code and the occurrence location information are input, to calculate the input malfunction code and the occurrence location information based on a parameter, and to output the content of the work to be performed for the malfunction," and in light of the above description, and in light of the above description, it is clear that the trained model of claim 3 is a "program" even though the claimed subject matter of claim 3 is described as a "model."

Therefore, the category of the invention of claim 3 is clear as an "invention of product."

Further, claim 3 states that the "trained model," which is the "program" "causes a computer to receive, as input, a malfunction code indicating the type of malfunction that has occurred in the copier and occurrence location information indicating the location where the malfunction occurred, to calculate the input malfunction code and the occurrence location information based on the parameter, and to output the content of the work to be performed for the malfunction," it is clear that the "trained model" causes the computer to function as means.

Therefore, the invention can be clearly identified from the statement of claim 3. Thus, claim 3 satisfies the clarity requirement.

(2024.3)

As with the other cases listed in "1. Cases pertinent to Description Req... 36 of the Patent Act)," this case explains the determination on the subject description requirements, or measures of the applicant, and does not explain the determination on other requirements such as eligibility for patent, novelty, and inventive step or measures of the applicant.

In addition, it should be noted that inventive step is generally denied in cases where the claimed invention is a "simple systematization of human tasks using artificial intelligence." (See

e.g. Case 33 and Claim 1 of Case XX in “5. Cases pertinent to Inventive Step (Article 29(2) of the Patent Act)”).

[Measures of the applicant]

Therefore, the applicant can overcome the reasons for refusal based on a violation of the clarity requirement by deleting claims 1 and 2 and maintaining only claim 3.

(2024.3)

2. Cases pertinent to Inventive Step

[Case 33]

Title of Invention

Cancer level calculation apparatus

What is claimed is:

[Claim 1]

A cancer level calculation apparatus that calculates a possibility that a subject person has cancer, using a blood sample of the subject person comprising

a cancer level calculation unit that calculates a possibility that a subject person has cancer, in response to an input of measured values of A marker and B marker that have been obtained through blood analysis of the subject person,

the cancer level calculation unit including a neural network that has been trained through machine learning using training data to calculate an estimated cancer level in response to the input of the measured values of A marker and B marker.

Overview of the description

[Background Art]

A possibility that a subject person has cancer is determined by a doctor, using measured values of specific markers obtained through blood analysis of the subject person.

[Problem to be Solved by the Invention]

To provide an apparatus that supports determination of a possibility that a subject person has cancer, regardless of a doctor's level of experience.

[Means for Solving the Problem]

(Omitted)

[Effects of the Invention]

(Omitted)

[State of the art (Prior art, well-known art, etc.)]

Cited invention 1 (Invention disclosed in the cited document 1 (D1)):

A cancer level calculation method of calculating a possibility that a subject person has cancer carried out by a doctor, using a blood sample of the subject person comprising

a step of cancer level calculation, wherein a possibility that a subject person has cancer is calculated, using measured values of A marker and B marker that have been obtained through blood analysis of the subject person.

Well-known art:

It is well-known, in the field of machine learning, to calculate an output data representing a possibility that a subject person has a certain disease based on a prescribed set of input data on the subject person, using a trained neural network, which has been trained through machine

learning with training data. The training data contains an input data that has been collected from multiple people, each of which consists of a prescribed set of input data (biological data etc.) on each person, and an output data representing a possibility that the person has the disease.

[Conclusion]

The invention of Claim 1 does not have an inventive step.

[Overview of Reason for Refusal]

The invention of Claim 1 and Cited Invention 1 are different from each other at the point below.

(Difference)

The invention of Claim 1 is a cancer level calculation apparatus that calculates a possibility that a subject person has cancer in response to an input of measured values of A marker and B marker, using a trained neural network through machine learning with training data. Meanwhile, Cited Invention 1 discloses a cancer level calculation method through which a doctor calculates a possibility that a subject person has cancer based on measured values of A marker and B marker.

The difference is assessed as follows.

It is well-known, in the field of machine learning, to calculate an output data representing a possibility that a subject person has a certain disease, based on a prescribed set of input data on the subject person, using a trained neural network, which is trained through machine learning with training data that have been collected from multiple people, each of which consists of a prescribed set of input data on each person and an output data representing a possibility that the person has the disease.

Both Cited Invention 1 and the well-known art relate to estimation of the possibility of illness, and they share a common problem to be solved. It is mere the exercise of the ordinary creativity of a person skilled in the art to systemize an estimation method carried out by a doctor in the medical field using a computer or the like.

In view of the factors above, a person skilled in the art can easily conceive of systemizing a calculation method of a possibility that a subject person has cancer, which has been carried out by a doctor, by applying the well-known art to Cited Invention 1, and calculating a possibility that a subject person has cancer in response to an input of measured values of A marker and B marker using a trained neural network through machine learning with training data.

Further, a person skilled in the art can readily anticipate the effects of the invention of Claim 1. Also, there are no obstructive factors found to apply the well-known art to Cited Invention 1.

[Explanation]
(Considered Motivation)
(1) Similarity of the problem to be solved

Both Cited Invention 1 and the well-known art aim at estimating a possibility that a subject person has a disease, and are common in the problem to be solved.

[Case 34]

Title of Invention

Estimation system of hydroelectric generating capacity

What is claimed is:

[Claim 1]

An estimation system of a hydroelectric power generating capacity of a dam comprising:

a neural network that is built by means of an information processor, the neural network having an input layer and an output layer, in which an input data to the input layer containing a precipitation amount of the upper stream of a river, a water flow rate of the upper stream of the river, and a water inflow rate into a dam during a predetermined period between a reference time and a predetermined time before the reference time, and an output data from the output layer containing a hydroelectric power generating capacity in the future after the reference time;

a machine learning unit that trains the neural network using a training data corresponding to actual values of the input data and the output data; and

an estimation unit that inputs the input data to the neural network that has been trained by the machine learning unit with setting a current time as the reference time, and then calculates an estimated value of a future hydroelectric power generating capacity based on the output data of which reference time is the current time.

[Claim 2]

The estimation system of a hydroelectric power generating capacity as in Claim 1, wherein the input data to the input layer further contains a temperature of the upper stream of the river during the predetermined period between the reference time and the predetermined time before the reference time.

Overview of the description

[Background Art]

A hydroelectric power generating capacity in the future is estimated by a dam operator by estimating a water inflow rate into a dam in the future based on a previous precipitation amount of the upper stream of the river, a water flow rate of the upper stream of the river and the like, and then converting the estimated water inflow rate into a hydroelectric power generating capacity.

[Problem to be Solved by the Invention]

Generally, a hydroelectric power generating capacity in the future is estimated based on a precipitation amount of the upper stream of the river, a water flow rate of the upper stream of the river, and an actual water inflow rate into a dam within the past few weeks. In many cases, dam operators make a function to calculate a water inflow rate in the future based on such data, input data that were obtained at certain times within the past few weeks to the function, and then convert the estimated water inflow rate into a hydroelectric power generating capacity.

In this method, however, operators have to make a function for each dam. Then, a

water inflow rate in the future should be calculated using this function and converted into a hydroelectric power generating capacity in an approximate way. As a result, a hydroelectric power generating capacity cannot be estimated with a high accuracy even if operators precisely modify a function itself.

In view of such a problem, it is an object of the present invention to provide an estimation system of a hydroelectric power generating capacity that can directly estimate a hydroelectric power generating capacity with a high accuracy.

[Means for Solving the Problem]

According to the invention of Claim 1, a neural network is trained through supervised machine learning using a training data. The training data includes an input data containing a precipitation amount of the upper stream of a river, a water flow rate of the upper stream of the river, and a water inflow rate into a dam during a predetermined period between a reference time and a predetermined time before the reference time; and an output data containing a hydroelectric power generating capacity in the future after the reference time. In response to an input of a precipitation amount of the upper stream of a river, a water flow rate of the upper stream of the river, and a water inflow rate into a dam before the current time to the trained neural network, a hydroelectric power generating capacity in the future is estimated.

According to the invention of Claim 2, the input data further includes a temperature of the upper stream of the river during a predetermined period between a reference time and a predetermined time before the reference time.

[Effects of the Invention]

According to the invention of Claim 1, a hydroelectric power generating capacity in the future can directly be estimated with a high accuracy using a trained neural network.

According to the invention of Claim 2, a temperature of the upper stream of the river is added to the input data. It allows a highly accurate estimation of an actual hydroelectric power generating capacity all year round, including the spring with a low precipitation. It has not been considered that there is a correlation between a hydroelectric power generating capacity and a temperature of the upper stream of the river, so far. However, it is possible to achieve a more accurate estimation taking an increase of inflow rate due to meltwater into consideration, with the use of an input data further containing a temperature.

[State of the art (Prior art, well-known art, etc.)]

Cited invention 1 (Invention disclosed in the cited document 1 (D1)):

An estimation system of a hydroelectric power generating capacity that carries out a multiple regression analysis by an information processor, comprising:

a regression equation model, in which explanatory variables are a precipitation amount of the upper stream of a river, a water flow rate of the upper stream of the river, and a water inflow rate into a dam during a predetermined period between a reference time and a predetermined time before the reference time, and an objective variable is a hydroelectric power generating capacity in the future after the reference time;

an analysis unit that calculates a partial regression coefficient of the regression equation model based on actual values corresponding to the explanatory variables and the objective variable; and

an estimation unit that, into the regression equation model to which the partial regression coefficient that has been calculated by the analysis unit is set, inputs data of the explanatory variables with setting a current time as the reference time, and then, calculates an estimated value of a future hydroelectric power generating capacity based on an output data from the objective variable setting a current time as the reference time.

Well-known art:

In the technical field of machine learning, it is well-known that an estimation process of an output in the future is carried out based on an input of time series data in the past, by using a trained neural network which has been trained with a training data containing an input of time series data in the past and a certain output in the future.

[Conclusion]

The invention of Claim 1 does not have an inventive step.

The invention of Claim 2 has an inventive step.

[Overview of Reason for Refusal]

The invention of Claim 1 and Cited Invention 1 are different from each other at the point below.

(Difference)

The invention of Claim 1 realizes an estimation of a hydroelectric power generating capacity by means of a neural network having an input layer and output layer. Meanwhile, Cited Invention 1 realizes an estimation of a hydroelectric power generating capacity by means of a regression equation model.

The difference is assessed as follows.

It is well known that an estimation process of an output in the future is carried out based on an input of time series data in the past, using a trained neural network. The neural network has been trained with a training data containing an input of time series data in the past and a certain output in the future. Cited Invention 1 and the well-known art are common with each other in estimating a certain output in the future based on an input of time series data in the past, with reference to a correlation among data.

Therefore, a person skilled in the art could easily derive a configuration that enables estimation of a hydroelectric power generating capacity, by applying the well-known art to Cited Invention 1 and adopting a trained neural network in substitution of a regression equation model.

Further, a person skilled in the art would expect the effect of the invention of Claim 1, and there is no obstructive factor found in applying the well-known art to Cited Invention 1.

[Explanation]
(Considered Motivation)
(1) Identical Operation or Function

Both Cited Invention 1 and the well-known art are common in an estimation of an output in the future through an input of time series data in the past based on a correlation among data, and are common in the function with each other.

(Explanation for no reason for refusal)

The invention of Claim 2 and Cited Invention 1 are different from each other at the point below.

(Difference)

The invention of Claim 2 contains, in an input data into an input layer, a temperature of the upperstream of the river during a predetermined period between a reference time and a predetermined time before the reference time. Meanwhile, Cited Invention 1 does not have such a configuration.

The difference is assessed as follows.

The invention of Claim 2 uses a temperature of the upperstream of the river for estimation of a hydroelectric power generating capacity. There is no prior art found disclosing such use of a temperature of the upperstream of the river. Accordingly, it is not a common general technical knowledge that there is a correlation between a temperature and a hydroelectric power generating capacity.

Generally, an input of data of which correlation is unknown may cause a noise in machine learning. However, the invention of Claim 2 uses an input data containing a temperature of the upperstream of the river during a predetermined period between a reference time and a predetermined time before the reference time. This enables a highly accurate estimation of a hydroelectric power generating capacity, taking an increase of inflow rate due to meltwater in the spring into consideration. It is a significant effect that a person skilled in the art cannot expect.

Accordingly, it does not considered to be a mere workshop modification that can be carried out in application of the well-known art to Cited Invention 1 by a person skilled in the art to contain, in an input data in an estimation of a hydroelectric power generating capacity, a temperature of the upperstream of the river during a predetermined period between a reference time and a predetermined time before the reference time.

Therefore, the invention of Claim 2 has an inventive step.

[Case 35]

Title of Invention

Screw clamping quality estimation apparatus

What is claimed is:

[Claim 1]

A screw clamping quality estimation apparatus that assesses a screw clamping quality at the time of automatic screw clamping operation by means of a screwdriver comprising:

a condition measurement unit that measures a set of condition variables containing a rotation speed, angular acceleration, position, and inclination of the screwdriver;

a machine learning unit that trains a neural network through machine learning by associating, with each other, the set of condition variables measured by the condition measurement unit and the screw clamping quality at the time of automatic screw clamping operation with the use of the set of condition variables; and

a screw clamping quality estimation unit that estimates a screw clamping quality in response to an input, to the neural network that has been trained by the machine learning unit, of the set of condition variables that have been measured at the time of automatic screw clamping operation by means of a screwdriver.

Overview of the description

[Background Art]

An automatic screw clamping operation is carried out by means of a screwdriver.

[Problem to be Solved by the Invention]

A product that has been assembled through automatic screw clamping operation is inspected by an operator to check whether a screw clamping quality meets a predetermined standard. This inspection burden the operator with a load and is a bottleneck for the whole process.

Inventors of the present invention found that a behavior of a screwdriver used in automatic screw clamping operation affects a screw clamping quality. In view of this, it is an object of the present invention to provide an apparatus that estimates a screw clamping quality based on a behavior of a screwdriver, in order to achieve a time-saving quality inspection.

[Means for Solving the Problem]

A set of state variables is obtained by measuring a combination of rotation speed, angular acceleration, position, and inclination of a screwdriver used in an automatic screw clamping operation. Assessment results by an operator is obtained as a screw clamping quality on a product that has been assembled through the automatic screw clamping operation. Then, a neural network is trained by using a training data containing (i) an input data of the set of state variables and (ii) an output data of a screw clamping quality at the time of the automatic screw clamping using the set of state variables. The screw clamping quality of a product is estimated

through an input of rotation speed, angular acceleration, position, and inclination of the screwdriver at the time of automatic screw clamping operation. A product of which screw clamping quality does not meet a predetermined standard, if any, is sorted to go on to a re-inspection process of a screw clamping quality by an operator or disposal.

[Effects of the Invention]

An apparatus of the present invention assesses a screw clamping quality of a product that has been assembled through an automatic screw clamping operation. Conventionally, an inspection by an operator is needed after an automatic screw clamping process, and it burdened an operator with a load. However, the present invention enables a time-saving inspection by using an estimated screw clamping quality.

[State of the art (Prior art, well-known art, etc.)]

Cited invention 1 (Invention disclosed in the cited document 1 (D1)):

A screw clamping quality estimation apparatus that assesses a screw clamping quality at the time of automatic screw clamping operation by means of a screwdriver comprising:

a condition measurement unit that measures a set of condition variables containing a rotation speed and angular acceleration of the screwdriver;

a machine learning unit that trains a neural network through machine learning by associating, with each other, the set of condition variables measured by the condition measurement unit and the screw clamping quality at the time of automatic screw clamping operation with the use of the set of condition variables; and

a screw clamping quality estimation unit that estimates a screw clamping quality in response to an input, to the neural network that has been trained by the machine learning unit, of the set of condition variables that have been measured at the time of automatic screw clamping operation by means of a screwdriver.

Cited invention 2 (Invention disclosed in the cited document 2 (D2)):

A screw clamping quality assessment method comprising:

measuring a position and inclination of a screwdriver; and

assessing a screw-clamping quality based on the measured position and inclination of the screwdriver.

Well-known art:

It is a common general technical knowledge in the technical field of machine learning to adopt, as an input to a machine learning device, variables that may have a correlation with an output with high possibility, in order to enhance a reliability and accuracy of an output from the machine learning device.

[Conclusion]

The invention of Claim 1 does not have an inventive step.

[Overview of Reason for Refusal]

The invention of Claim 1 and Cited Invention 1 are different with each other at the point below.

(Difference)

According to the invention of Claim 1, a condition measurement unit measures a set of condition variables containing a rotation speed, angular acceleration, position, and inclination of a screwdriver. Using the set of condition variables containing these four types of variable, a machine learning of a neural network is carried out and a screw clamping quality is estimated. Meanwhile, according to Cited Invention 1, a condition measurement unit measures a set of condition variables containing a rotation speed and angular acceleration of a screwdriver. Using the set of condition variables containing these two types of variable, a machine learning of a neural network is carried out and a screw clamping quality is estimated.

The difference is assessed as follows.

Cited Invention 2, in which a screw clamping quality is assessed based on a position and inclination of a screw driver, discloses that there is a correlation between a position and inclination of a screw driver and it affects the assessment. Both Cited Invention 1 and Cited Invention 2 assess a screw clamping quality based on several conditions of a screw driver, and have a common object. Further, it is a common general technical knowledge in the technical field of machine learning to adopt, as an input to a machine learning device, variables that may have a correlation with an output with high possibility, in order to enhance a reliability and accuracy of an output from the machine learning device.

In view of the above, a person skilled in the art can easily derive a configuration that enables a machine learning of a neural network and an estimation of screw clamping quality using a set of condition variables containing four types of variable (in addition to a rotation speed and angular acceleration of a screwdriver in Cited Invention 1, a position and inclination of a screwdriver having a correlation with a screw clamping quality in Cited Invention 2 are adopted), in order to enhance a reliability and accuracy of an output from a machine learning device.

Further, a person skilled in the art can expect the effect of the invention of Claim 1, and thus, there is no obstructive factor found to apply Cited Invention 2 to Cited Invention 1.

[Explanation]

(Considered Motivation)

(1) Relation of technical fields

Both Cited Invention 1 and Cited Invention 2 aim at estimating a screw clamping quality, and are common with each other in the technical field.

(2) Similarity of the problem to be solved

Both Cited Invention 1 and Cited Invention 2 aim at assessing a screw clamping quality

based on several conditions of a screw driver, and are common with each other in the problem to be solved.

[Case 36]

Title of Invention

Dementia stage estimation apparatus

What is claimed is:

[Claim 1]

A dementia stage estimation apparatus comprising:

a speech information obtainment means for obtaining a speech information on a conversation between a questioner and a respondent;

a speech information analysis means for analyzing the speech information, and then specifying a speech section by the questioner and a speech section by the respondent;

a speech recognition means for converting, through speech recognition, the speech information on the speech section by the questioner and the speech section by the respondent into text and then outputting a character string;

a question topic specification means for specifying a question topic by the questioner based on the result of the speech recognition; and

a dementia stage determination means for inputting, to a trained neural network, the question topic by the questioner and the character string of the speech section by the respondent to the question topic in an associated manner with each other, and then determining a dementia stage of the respondent,

wherein the neural network is trained through machine learning using training data so as to output an estimated dementia stage, in response to an input of the character string of the speech section by the respondent in an associated manner with the question topic by the questioner.

Overview of the description

[Background Art]

It is well-known that a doctor asks questions to a subject person and observes the way the person responds to the question, to make a diagnosis of the degree of dementia (dementia stage).

[Problem to be Solved by the Invention]

A dementia stage diagnosis greatly depends on a doctor's experience and needs expertise. There is a pressing need for medical specialists in the field of dementia. It is a possible solution to solve such a problem to provide a diagnosis support for relatively inexperienced doctors taking advantage of a machine learning technique, by training a neural network with know-how of well-experienced doctors and then using the trained network.

However, a conversation for dementia diagnosis between a questioner and a respondent varies every time. Thus, it does not seem that only an input to a neural network using machine learning brings about such results that can readily be used at the site.

It is an object to provide an apparatus that enables a highly accurate estimation of dementia stage by extracting a significant information from a speech information on a conversation for dementia diagnosis between a questioner and a respondent.

[Means for Solving the Problem]

The inventor of the present invention found that an information on a conversation between a questioner and respondent for dementia stage diagnosis as well as know-how of a well-experienced doctor specializing in dementia and a subject person can effectively be updated in a trained neural network through machine learning with a training data. A question topic by the questioner (food, weather, and family etc.) and a response by the respondent to the question (a character string obtained through conversion into text) are extracted through a speech recognition technique in an associated manner with each other. The training data contains question topics and corresponding responses to each topic as well as diagnosis (on a dementia stage of a subject person) by a well-experienced doctor.

With the above-mentioned trained neural network, a dementia stage estimation apparatus of the present invention is configured to estimate a dementia stage with a high accuracy.

[Effects of the Invention]

A support for a highly accurate dementia stage diagnosis can be realized through a dementia stage estimation with the above-mentioned trained neural network based on an input containing a question topic by a well-experienced doctor and a response by a subject person to the question that have been extracted from a speech information.

[State of the art (Prior art, well-known art, etc.)]

Cited invention 1 (Invention disclosed in the cited document 1 (D1)):

A dementia stage estimation apparatus comprising:

a speech information obtainment means for obtaining a speech information on a conversation between a questioner and a respondent;

a speech recognition means for converting the speech information into text through speech recognition and outputting a character string; and

a dementia stage determination means for inputting, to a trained neural network, the character string that has been converted into text by the speech recognition means, and then determining a dementia stage of the respondent,

wherein the neural network is trained through machine learning using training data so as to output an estimated dementia stage in response to an input of the character string.

(Cited Document 1 discloses that the dementia stage estimation apparatus can estimate a dementia stage of a respondent with a certain accuracy.)

[Conclusion]

The invention of Claim 1 has an inventive step.

[Explanation]
(Basis for Determination that there is No Reason for Refusal found)

The invention of Clam 1 and Cited Invention 1 are different from each other at the point below.

(Difference)

According to the invention of Claim 1, a speech information on a conversation between a questioner and a respondent is analyzed, and then a speech section by the questioner and a speech section by the respondent are specified, respectively. The speech information on a speech section by a questioner and a speech section by a respondent is converted into text through speech recognition, and a character string is obtained. Based on the result of the speech recognition of the speech section by the questioner, a question topic by the questioner is specified. The question topic by the questioner and a character string of the speech section by the respondent to the question topic are input to a neural network in an associated manner with each other. The neural network is configured to carry out machine learning and output a dementia stage. Meanwhile, according to Cited Invention 1, a neural network is configured to output a dementia stage, based on an input of a character string that has been converted into text through a speech recognition without a classification between a speech section by a questioner and a speech section by a respondent.

The difference is assessed as follows.

A person skilled in the art would conceive a modification of a training data, which is an input to a neural network for machine learning, through a certain pre-processing in order to improve an accuracy of estimation by the neural network.

However, there is no prior art found that discloses a specific technique related to dementia stage assessment, in which a speech information on a conversation between a questioner and a respondent is converted into text, a question topic by the questioner is specified in a character string in the text, the specified question topic and a response to the question by the respondent is associated with each other to assess a dementia stage. Further, it is not a common general technical knowledge at the time of filing.

Accordingly, a person skilled in the art cannot easily conceive training a neural network with a training data that has been obtained by specifying a question topic by a questioner and associating the specified question topic and a response to the question by a respondent with each other, to train the neural network in Cited Invention 1 with a speech information on a conversation between a questioner and a respondent. Further, it does not seem to be a mere design modification or matter of design choice of an identifier for improving an estimation accuracy in Cited Invention 1.

Furthermore, the invention of Claim 1 brings about a significant effect, that is, a highly accurate dementia stage estimation by specifying a question topic by a questioner and a response by a respondent (corresponding character string) to the question topic in an associated manner

with each other. It is because a neural network can effectively learn know-how of a well-trained doctor from a training data.

Therefore, the invention of Claim 1 has an inventive step.

[Case 37]

Title of Invention

Automatic Response Generator for Customer Service Centers

What is claimed is:

[Claim 1] (Claim involving no inventive step)

An automatic response generator for a customer service center for receiving a question text of an inquiry about a financial product from an inquirer and automatically generating a response text to the question text;

wherein a response text is generated by inputting the question text into large language models.

Overview of the description

[Background Art]

Employees in a customer service center for financial products manually prepare a response text to an external question text based on examples from past inquiries.

[Problems to be Solved by the Invention]

At present, responding to such inquiries is a problem that places a heavy burden on employees, as response texts are generated manually.

It also creates a problem in providing consistent customer service to the inquirer, as the skills of the employees vary.

To solve these problems, an automatic response generator for a customer service center is provided, which automatically outputs a response text to a question text of an inquiry, regardless of the skill of the employee.

[Means for Solving the Problem]

(Omitted)

[Effect of Invention]

(Omitted)

(Supplementary Explanation)

The detailed description of the invention discloses the use of the large language models (learning model, learning data and learning method, etc.) of the claimed invention to the extent that it can be carried out by a person skilled in the art.

[State of the art (Prior art, well-known art, etc.)]

Cited invention 1 (Invention disclosed in the cited document 1):

A method of preparing a response text for receiving a question text of an inquiry about a

financial product from an inquirer and preparing a response text to the question text by a customer service center employee;

wherein a response text is prepared by searching a database of accumulated examples of past inquiries and referring to examples matching the question text.

Commonly Used Art:

In the technical field of information processing, the process of inputting question texts into large language models to obtain response texts is commonly used to improve the efficiency of human tasks.

[Conclusion]

The invention of claim 1 lacks an inventive step.

[Overview of Reason for Refusal]

The invention of claim 1 differs from the cited invention 1 in the following aspects.

(Difference)

While the invention of claim 1 is an automatic response generator for a customer service center that receives a question text of an inquiry about a financial product from an inquirer and automatically generates a response text by inputting the question text into large language models, the cited invention 1 is a method for preparing a response text, in which a customer service center employee receives an inquiry about a financial product from an inquirer, searches a database of accumulated examples of past inquiries, and refers to examples that match the question text to prepare a response text.

The above difference will be examined.

In many business fields, including customer service, it is a self-evident problem that a person skilled in the art normally takes into consideration to improve efficiency by automating human tasks with computers, and it would also be taken into consideration in the cited invention 1.

In addition, in the technical field of information processing, the process of inputting question texts into large language models to obtain response texts is commonly used to improve the efficiency of human tasks.

Therefore, it has been easily conceivable for a person skilled in the art to provide an "automatic response generator for a customer service center for automatically generating a response text to a question text by inputting the question text into large language models" by applying the commonly used art of "inputting question texts into large language models to obtain response texts," which is the solution for this problem, to the cited invention 1 in order to solve the problem of improving efficiency by automating human tasks with a computer for automatically generating response texts in the cited invention 1.

In addition, with respect to the task of an automatic response generator receiving inquiries about a financial product from an inquirer, automating such a task by using the automatic response generator is an ordinary creative activity of a person skilled in the art and it could have been appropriately performed by a person skilled in the art.

Further, a person skilled in the art can readily anticipate the effects of the invention of claim 1, and there are no obstructive factors found to apply the commonly used art to the cited Invention 1.

[Explanation]
(Matters of consideration for motivation)
・Self-evident problems

In many business fields, including customer service, it is a self-evident problem that a person skilled in the art normally takes into consideration to improve efficiency by automating human tasks and business methods with computers, and it would also be taken into consideration in the cited invention 1.

[Case 38]

Title of Invention

Method for Generating Texts for Prompt for Input into Large Language Models

What is claimed is:

[Claim 1] (Lacking inventive step)

A method for generating texts for prompts, which are generated by a computer for input into large language models by adding reference information to an input question texts,

wherein the large language models have a character limit, which is the maximum number of characters in a prompt that can be input, and when a prompt containing a question text is input, the large language models output an answer text relating to the question text,

and wherein the method for generating texts for prompts executes

an additional text generation step of generating an additional text related to the question text based on the input question text so that the total number of characters including the number of characters of the question text is equal to or less than the character limit,

and a prompt generation step of generating the prompt by adding the additional texts generated by the additional text generation step to the input question text as reference information.

[Claim 2] (Involving inventive step)

The method for generating texts for prompts according to claim 1, wherein the additional text generation step is a step of obtaining a plurality of related texts related to the question text based on the input question text, extracting a plurality of keywords suitable as reference information from the obtained related sentences, and generating the additional text in which the total number of characters does not exceed the character limit using the plurality of keywords.

Overview of the description

[Background Art]

Recently, the use of large language models (LLMs), which perform natural language processing to be used for question and answer, has been advanced, but there is a problem of incorrect answers being output by Large Language Models.

As a means of solving this problem, a process has been carried out in which a prompt is generated by adding reference information to a question text, and the prompt is fed into large language models to increase the likelihood of obtaining an appropriate response text that takes the reference information into account.

In the detailed description of the invention, large language models refer to a language model that is trained on large amounts of text data and that performs natural language processing.

[Problems to be Solved by the Invention]

However, large language models sometimes have an input character limit when in use, and

there is a problem that reference information cannot be added to an input question text indefinitely. To solve such a problem, the invention is to provide a method for generating texts for prompts within a predetermined character limit by adding valid reference information to a question text.

[Means for Solving the Problem]

According to the invention of claim 1, a method is provided for generating texts for prompts performed by a computer. An input question text is used as a base to generate an additional text related to the question text so that the total number of characters including the number of characters of the question text is equal to or less than the character limit. The generated additional text is then added to the input question text to generate a prompt.

Further according to the invention of claim 2, in the additional text generation step, a plurality of related texts related to the question text are obtained based on the input question text, a plurality of keywords suitable as reference information are extracted from the plurality of related texts obtained, and an additional text in which the total number of characters does not exceed the character limit is generated by using the plurality of keywords.

As for obtaining related texts, a database may be provided in which, for example, the question history, action history, and purchase history of the questioner are accumulated, and a plurality of related texts may be generated by extracting information highly relevant to the question text from the database.

[Effect of Invention]

According to the invention of claim 1, when generating a prompt by adding additional texts related to the input question text, even if there is a character limit, which is the maximum number of characters that can be input into large language models as a prompt, the additional texts are generated with the number of characters not exceeding the character limit, so that a prompt can be generated within the prescribed character limit with valid additional texts as reference information for the input question text.

According to the invention of claim 2, prompts with additional texts highly relevant to the question text and suitable as reference information can be generated within a predetermined character limit, thereby providing an effect of obtaining more reliable and appropriate answer texts.

(Supplementary Explanation)

As for the additional text generation step of the invention of claim 2, [Means for solving the problem] includes, in addition to the above description, a plurality of concrete examples of methods for obtaining a plurality of related texts related to the question text based on the input question text, extracting a plurality of suitable keywords as reference information from the obtained related texts, and generating additional texts in which the total number of characters does not exceed the character limit by using the plurality of keywords; and those skilled in the art can understand from the detailed description of the invention the effect of the methods by which

prompts with additional texts that are highly relevant to the question text and suitable as reference information can be generated within a predetermined character limit, thereby obtaining more reliable and appropriate answer texts.

Also for the invention of claim 1, a method other than the invention of claim 2 by which the total number of characters of the question text and the additional texts does not exceed the character limit is specifically disclosed in the detailed description of the invention.

[State of the art (Prior art, well-known art, etc.)]
Cited invention 1 (Invention disclosed in the cited document 1):

A method for generating texts for prompts which are generated by a computer for input to large language models by adding reference information to the input question texts,

wherein the large language models, upon input of a prompt containing a question text, output an answer text related to the question text;

and the computer

executes an additional text generation step of generating additional texts related to the question text based on the input question text,

and a prompt generation step of generating the prompt by adding the additional texts generated by the additional text generation step to the input question text as the reference information.

(Supplementary Explanation)

The cited invention 1 is characterized by the method for learning large language models, and the prior art 1 does not mention the problem of having a character limit that can be input to large language models, or disclose any means for solving this problem.

Common general knowledge:

In the technical field of language processing, it is a self-evident problem that a person skilled in the art normally takes into consideration to reduce the volume of information processing, and it is well-known art at the time of filing to set a character limit, which is the maximum number of characters that can be input, and if a text exceeds the character limit, the part of the text that exceeds the character limit is discarded so that the actual text input is less than or equal to the character limit as a solution for the problem.

[Conclusion]

The invention of claim 1 lacks an inventive step.

The invention of claim 2 involves an inventive step.

[Overview of Reason for Refusal]

When the invention of claim 1 is compared with the cited invention 1, they differ in the following aspects.

(Difference)

In the large language models of the invention of claim 1, a character limit, which is the maximum number of characters of a prompt that can be input, is set, and additional texts related to the question text are generated such that the total number of characters including the number of characters of the question text is equal to or less than the character limit in the additional text generation step, whereas it is unclear whether or not a character limit, which is the maximum number of characters in a prompt that can be input, is set in the large language models of the cited invention 1, and it is unclear whether or not additional texts are generated in the additional text generation step as described above.

The above difference will be examined.

In the technical field of language processing, it is a self-evident problem that a person skilled in the art normally takes into consideration to reduce the volume of information processing, and it is well-known art at the time of filing to set a character limit, which is the maximum number of characters that can be input, and if a text exceeds the character limit, the part of the text that exceeds the character limit is discarded so that the actual text input is less than or equal to the character limit as a solution for the problem.

Therefore, a person skilled in the art could have easily arrived at the invention in which a character limit, which is the maximum number of characters of a prompt that can be input, is set, and in the additional text generation step, when the number of characters of the prompt exceeds the character limit, the part of the text that exceeds the character limit is discarded, and additional texts related to the question text are generated such that the total number of characters, including the number of characters of the question text is equal to or less than the character limit, and the actual prompt input is generated such that the number of characters is less than or equal to the character limit, in implementing the large language models of the cited invention 1 by applying the well-known art to the cited invention 1.

[Explanation]

(Explanation for no reason for refusal in Claim 2)

When the invention of claim 2 is compared with the cited invention 1, they also differ in the following aspects.

(Difference)

In the additional text generation step of the invention of claim 2, a plurality of related texts related to the question text are obtained based on the input question text, a plurality of keywords suitable as reference information are extracted from the plurality of related texts obtained, and additional texts in which the total number of characters does not exceed the character limit are generated using the plurality of keywords,

whereas, the additional text generation step of the cited invention 1 does not specify any of the above.

The above difference will be examined.

In the invention of claim 2, a plurality of related texts related to the question text are obtained based on the input question text, a plurality of keywords suitable as reference information are extracted from the plurality of related texts obtained, and additional texts in which the total number of characters does not exceed the character limit are generated using the plurality of keywords, thereby generating a prompt with the number of characters not exceeding the limit of characters that can be input to the trained language models. However, no prior art is found disclosing such a configuration, or it is not common general technical knowledge at the time of filing.

The invention of claim 2 can generate prompts with additional texts that are highly relevant to the question text and suitable as reference information within a predetermined character limit, thereby obtaining more reliable and appropriate answer texts due to the configuration, which provides an advantageous effect over the cited invention 1, and the above-mentioned configuration cannot be said to be a design variation, etc., which may be performed when the well-known art is applied to the cited invention 1.

Therefore, the invention of claim 2 involves an inventive step.

[Case 39]

Title of Invention Method for Learning Trained Models for Radiographic Image Brightness Adjustment

What is claimed is:

[Claim 1]

A method for learning a trained model by a machine learning process, wherein a radiographic image of the human body is input to output a brightness adjustment parameter of the radiographic image,

the method comprising

a step of obtaining training data including a learning radiographic image and a training image in which the learning radiographic image is adjusted in brightness,

a step of inputting the learning radiographic image contained in the training data and outputting the brightness adjustment parameter of the learning radiographic image by the learning model which is learning,

a step of obtaining a value for the loss function using the brightness adjustment parameter output by the learning model,

and a step of optimizing the learning model so that the value of the loss function is reduced, which are executed by a computer,

wherein the loss function is a function based on the error between the pixel values of the training image and the pixel values of the brightness adjusted image, in which the learning radiographic image is adjusted in brightness based on the brightness adjustment parameter output by the learning model

and the loss function is configured to bias the learning to suppress the occurrence of pixel value saturation by integrating a predetermined weight for the error such that the value for the loss function is estimated to be relatively large.

Overview of the description

[Background Art]

For radiographic images of the human body taken for diagnostic purposes, the brightness is adjusted so that the brightness is appropriate for diagnosis.

[Problems to be Solved by the Invention]

One method of adjusting the brightness of such radiographic images is to convert the brightness value of each pixel in an input image of the human body according to a predetermined algorithm. The problem is that visibility is degraded if the range of brightness adjustment is inappropriate, or the algorithm cannot handle images that deviate from the assumed distribution of pixels, making them inappropriate for diagnosis.

Another method is to estimate brightness adjustment parameter directly from the input image using a trained model that has been machine-trained using a large number of learning data.

However, if a trained model is used that is simply trained to output optimal values, the output brightness adjustment parameter will be biased toward increasing or decreasing the brightness relative to the optimal values. Therefore, the bias of brightness to increase or decrease brightness relative to the optimal values causes the problem of saturation of pixel values, such as overexposure or underexposure.

A problem to be solved by the invention is to provide a method for learning a trained model by a machine learning process used for adjusting the brightness of radiographic images that can prevent pixel value saturation and improve visibility.

[Means for Solving the Problem]

According to the invention of claim 1, a method is provided for learning a trained model by a machine learning process in which a radiographic image of the human body is input to output the brightness adjustment parameter of the input radiographic image.

The method comprises a step of obtaining training data including a learning radiographic image and a training image in which the learning radiographic image is adjusted in brightness, a step of inputting the learning radiographic image included in the training data and outputting a brightness adjustment parameter of the learning radiographic image by a learning model which is learning, a step of obtaining a value of a loss function using the brightness adjustment parameter output by the learning model, and a step of optimizing the learning model so that the value of the loss function is reduced, which are executed by a computer.

Here, the loss function is a function based on the error between the pixel values of the training image and the pixel values of the brightness adjusted image, in which the learning radiographic image is adjusted in brightness based on the brightness adjustment parameter output by the learning model, and the loss function is configured to bias the learning to suppress the occurrence of pixel value saturation in pixels where pixel value saturation occurs in the brightness adjusted image, by integrating a predetermined weight for the error such that the value for the loss function is estimated to be relatively large.

[Effect of Invention]

According to the invention of claim 1, the learning is biased to suppress the occurrence of pixel value saturation in pixels where pixel value saturation occurs in the brightness adjusted image, in which the learning radiographic image is adjusted in brightness based on the brightness adjustment parameter output by the learning model by integrating a predetermined weight for the error such that the value for the loss function is estimated to be relatively large, and thereby enabling the trained model used for brightness adjustment of radiographic images to prevent pixel value saturation and improve visibility.

[State of the art (Prior art, well-known art, etc.)]

Cited invention 1 (Invention disclosed in the cited document 1):

A method for learning a trained model by a machine learning process, wherein a

radiographic image of the human body is input to output a brightness adjustment parameter of the radiographic image,
the method comprising

a step of obtaining training data including a learning radiographic image and a training image in which the learning radiographic image is adjusted in brightness,

a step of inputting the learning radiographic image contained in the training data and outputting the brightness adjustment parameter of the learning radiographic image by the learning model which is learning,

a step of obtaining a value for the loss function using the brightness adjustment parameter output by the learning model,

and a step of optimizing the learning model so that the value of the loss function is reduced, which are executed by a computer,

wherein the loss function is a function based on the error between the pixel values of the training image and the pixel values of the brightness adjusted image, in which the learning radiographic image is adjusted in brightness based on the brightness adjustment parameter output by the learning model.

(Problems to be solved)

A highly accurate brightness adjustment parameter can be estimated by a machine learning process using a loss function with training data, including input images and training images, to train the learning model.

[Conclusion]

The invention of claim 1 involves an inventive step.

[Explanation]

(Explanation for no reason for refusal)

When the invention of claim 1 is compared with the cited invention 1, they differ in the following aspects.

(Difference)

The invention of claim 1 is configured to bias the learning to suppress the occurrence of pixel value saturation in pixels where pixel value saturation occurs in the brightness adjusted image by integrating a predetermined weight for the error between the pixel values of the training image and the pixel values of the brightness adjusted image such that the value for the loss function is estimated to be relatively large, whereas there is no such configuration in the cited invention 1.

The above difference will be examined.

A person skilled in the art would conceive changing the configuration of the loss function

to improve the estimation accuracy of the trained model created by the machine learning process when performing the machine learning process using the loss function, and thus it is a mere design modification or matter of design choice.

However, there is no prior art documents found disclosing a specific feature according to the difference with respect to a learning method of a trained model used for image processing of radiographic images, and such a loss function is not a common general technical knowledge at the time of filing.

In the configuration according to the above difference, the learning is biased to suppress the occurrence of pixel value saturation, thereby providing an effect of being able to train a trained model used for adjusting the brightness of a radiographic image that can prevent pixel value saturation and improve visibility, which is an advantageous effect over the cited invention 1 that is difficult to predict from the cited invention 1, which focuses merely on the general issue of improving the accuracy of the machine learning process.

When the above circumstances are taken into consideration comprehensively, the reasoning is not possible that a person skilled in the art could have easily conceived the configuration according to the difference from the cited invention 1.

Therefore, the invention of claim 1 involves an inventive step.

[Case 40]

Title of Invention

Laser Beam Processing Device

What is claimed is:

[Claim 1]

A laser beam processing device for welding by irradiating a laser beam onto a workpiece, comprising

a control unit that controls the laser beam processing device based on a plurality of processing parameters related to laser beam processing;

a light intensity detection unit that detects the light intensity in a predetermined wavelength band of reflected light generated from the workpiece by irradiation of the laser beam as a light intensity signal;

an average value extraction unit that extracts the average value obtained from the time-series signal of the light intensity signal;

a machine learning unit that performs a machine learning process of a learning model using the input data as the average value and the output data as the adjustment amount of the plurality of processing parameters, and the past actual values of the input data and the output data as the training data;

and a processing parameter adjustment unit that inputs the input data to the trained model obtained by the machine learning process in the machine learning unit, outputs the adjustment amount of the plurality of processing parameters as the output data, and inputs the adjustment amount of the plurality of processing parameters to the control unit.

[Claim 2]

The laser beam processing device according to claim 1, comprising an accumulated usage time storage unit which stores the accumulated usage time of a laser oscillator,

wherein the input data further includes the accumulated usage time of the laser oscillator.

Overview of the description

[Background Art]

In laser beam welding, processing parameters are preset according to various conditions. Furthermore, in laser beam welding, the above-mentioned preset processing parameters are adjusted by the operator by setting compensation amounts according to the conditions during processing.

[Problems to be Solved by the Invention]

In laser beam welding, examples of processing parameters include laser power, processing head motion speed, laser focus position, and shielding gas pressure. When the operator adjusts

the processing parameters, several processing parameters should be searched at the same time, so it requires a very large number of trials, and there is a problem of having a long working time to complete the adjustment.

[Means for Solving the Problem]
(Omitted)

[Effect of Invention]

The invention of claim 1 can improve the efficiency of the adjustment work of a plurality of processing parameters by the operator.

The invention of claim 2 can significantly improve the accuracy of estimating the adjustment amount of a plurality of processing parameters by using the "accumulated usage time of the laser oscillator" as input data, which is usually not considered by the operator.

(Supplementary Explanation)

With respect to claim 2, the detailed description of the invention fully explains or verifies that the accuracy of estimating the adjustment amount of a plurality of processing parameters by a trained model can be improved by adding the "accumulated usage time of the laser oscillator" to the input data.

[State of the art (Prior art, well-known art, etc.)]
Cited invention 1 (Invention disclosed in the cited document 1):

A method for laser beam processing performed by an operator using a laser beam processing device for welding by irradiating a laser beam onto a workpiece,

wherein the laser beam processing device comprises a control unit that controls the laser beam processing device based on a plurality of processing parameters related to laser beam processing;

a light intensity detection unit that detects the light intensity in a predetermined wavelength band of reflected light generated from the workpiece by irradiation of the laser beam as a light intensity signal;

and an average value extraction unit that extracts the average value obtained from the time-series signal of the light intensity signal,

wherein the operator determines the adjustment amount of the plurality of processing parameters to be input based on the average value and inputs the adjustment amount of the plurality of processing parameters to the control unit.

Commonly Used Art:

In the technical field of information processing, machine-trained models are commonly used for human decisions as an alternative to improve the efficiency of the human task.

[Conclusion]

The invention of claim 1 lacks an inventive step.

The invention of claim 2 involves an inventive step.

[Overview of Reason for Refusal]

When the invention of claim 1 is compared with the cited invention 1, they differ in the following aspects.

(Difference)

The invention of claim 1 is a laser beam processing device comprising a machine learning unit that performs a machine learning process of a learning model using the input data as an average value obtained from the time-series signal of light intensity signals and the output data as the adjustment amount of a plurality of processing parameters, and the past actual values of the input data and the output data as the training data, and a processing parameter adjustment unit that inputs the input data to the trained model obtained by the machine learning process in the machine learning unit, outputs the adjustment amount of the plurality of processing parameters as the output data, and inputs the adjustment amount of the plurality of processing parameters to the control unit, whereas the cited invention 1 is a method for laser beam processing, in which the operator determines the adjustment amount of the plurality of processing parameters to be input based on an average value obtained from the time-series of light intensity signals, and inputs the adjustment amount of the plurality of processing parameters to the control unit.

The above difference will be examined.

In many technical fields, including machine processing, it is a self-evident problem that a person skilled in the art normally takes into consideration to systematize the service or method for doing business performed by humans so that it can be implemented by a computer to improve the efficiency, which is also considered in the cited invention 1.

In the technical field of information processing, machine-trained models are commonly used for human decisions as an alternative to improve the efficiency of the human task.

Therefore, in the cited invention 1, a person skilled in the art could have been easily conceived to apply the commonly used art of "using machine-trained models for human decisions as an alternative," which is the solution for the problem, to the cited invention 1, in order to solve the problem of improving efficiency by systematizing the service or method for doing business performed by humans so that it can be implemented by a computer and to systematize the method for laser beam processing to determine the adjustment amount of a plurality of processing parameters to be input based on the average value obtained from the time-series signal of light intensity signals, which was performed by the operator, and to input the adjustment amount of the plurality of processing parameters to the control unit,

and to configure the laser beam processing device to comprise a machine learning unit that performs a machine learning process of a learning model using the input data as average values

obtained from the time-series signals of light intensity signals and the output data as the adjustment amount of a plurality of processing parameters, and the past actual values of the input data and the output data as the training data, and a processing parameter adjustment unit that inputs the input data to the trained model obtained by the machine learning process in the machine learning unit, outputs adjustment amount of the plurality of processing parameters as the output data, and inputs the adjustment amount for the plurality of processing parameters to the control unit.

[Explanation]
(Considered motivation)
・Self-evident problems

In many technical fields, including machine processing, it is a self-evident problem that a person skilled in the art normally takes into consideration to systematize the service or method for doing business performed by humans so that it can be implemented by a computer to improve the efficiency, which is also considered in the cited invention 1.

(Explanation for no reason for refusal in Claim 2)

When the invention of claim 2 is compared with the cited invention 1, they also differ in the following aspects.

(Difference)

In the invention of the laser beam processing device of claim 2, the laser beam processing device comprises an accumulated usage time storage unit which stores the accumulated usage time of the laser oscillator and the input data includes the accumulated usage time of the laser oscillator, whereas the cited invention 1 is a laser beam processing method, and the laser beam processing device does not comprise an accumulated usage time storage unit which stores the accumulated usage time of the laser oscillator, and the determination of the adjustment amount of a plurality of processing parameters is not based on the accumulated usage time of the laser oscillator.

The above difference will be examined.

In the invention of claim 2, the laser beam processing device comprises an accumulated usage time storage unit which stores the accumulated usage time of the laser oscillator, and the input data includes the accumulated usage time of the laser oscillator, but there is no prior art found that discloses such configuration, and it is not a common general technical knowledge at the time of filing.

In addition, in the technical field of laser beam processing device, there is no prior art found that discloses the laser beam processing device comprising an accumulated usage time storage unit which stores the accumulated usage time of the laser oscillator, wherein the accumulated usage time of the laser oscillator is taken into account when the processing parameters are

adjusted by the operator, and it is not a common general technical knowledge at the time of filing.

The invention of claim 2 achieves the advantageous effect over the cited invention 1 that the estimation accuracy of the adjustment amount of a plurality of processing parameters is significantly improved by the configuration according to the difference, and cannot be said to be a design variation, etc., which may be performed when the commonly used art is applied to the cited invention 1.

Therefore, the invention of claim 2 has an inventive step.

3. 3. Case Examples for AI-Related Technology that have already been Incorporated in Examination Handbook for Patent and Utility Model

[Case 3-2] Sugar Content Data of Apples and a Method for Predicting Sugar Content Data of Apples

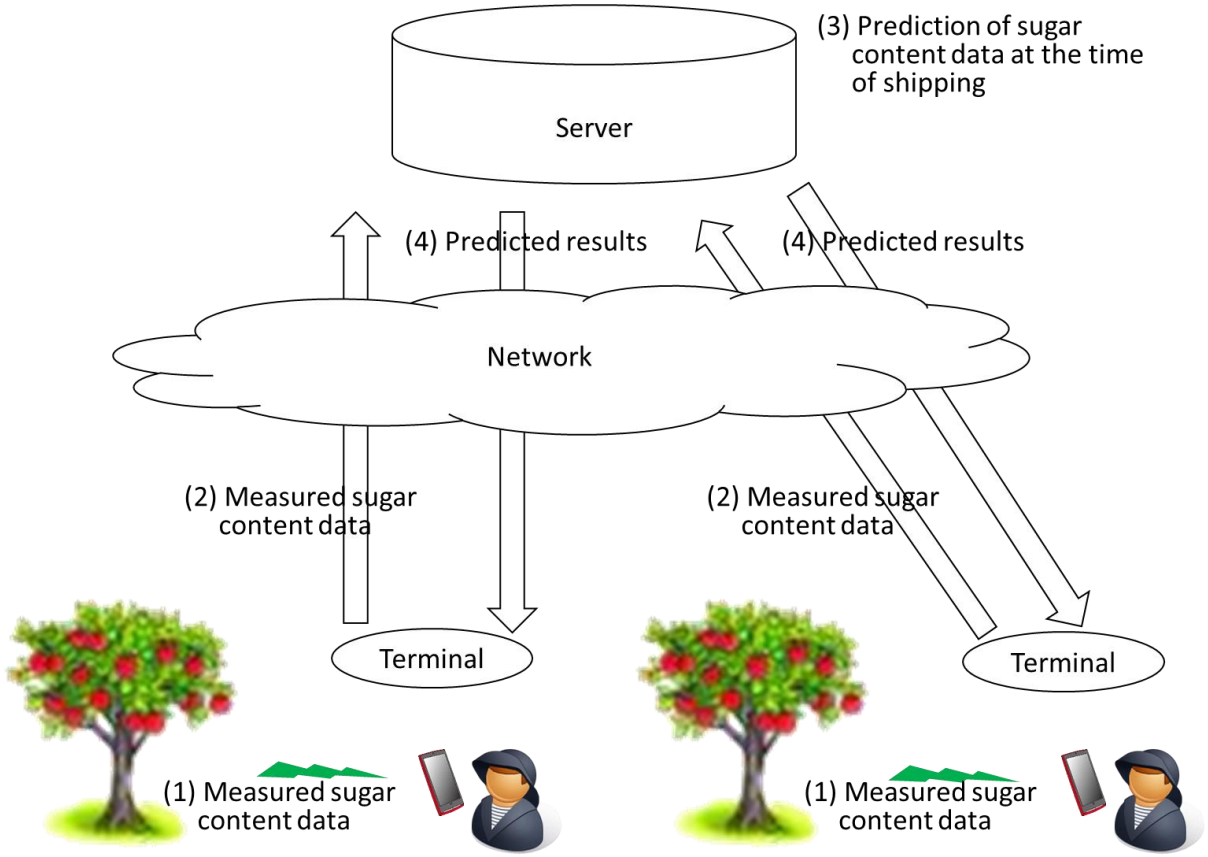
Title of Invention

Sugar Content Data of Apples and a Method for Predicting Sugar Content Data of Apples

What is claimed is:

[Claim 1] Sugar content data of preharvest apples on trees measured by a portable sugar content sensor for apples which performs reflective near-infrared spectroscopic analyses.	[Claim 1] Does not fall under "invention."
[Claim 2] The sugar content data of apples as described in Claim 1 received by a receiving unit of a server and stored in a memory unit of the said server.	[Claim 2] Does not fall under "invention."
[Claim 3] A method for predicting sugar content data of apples comprising; a step in which an analyzing unit of the server analyzes the relationship between sugar content data of preharvest apples for specified periods and data on meteorological conditions, and sugar content data of apples at the time of their shipping, based on past performance; a step in which the receiving unit of the said server receives the sugar content data of apples for specified periods as described in Claim 1; and a step in which a prediction unit of the said server predicts and outputs sugar content data of apples at the time of future shipping using the said received sugar content data of apples for specified periods and data on past and future meteorological conditions as inputs, based on the said analyzed relationships.	[Claim 3] Falls under "invention."

Drawing



Overview of the description

[Technical Field]

The present invention relates to sugar content data of apples and a method for predicting sugar content data of apples.

[Background Art]

The sugar content of apples is an important indicator at the time of shipping apples. Therefore, the sugar content of apples has been measured at the time of shipping. Apples are shipped after being graded based on measured sugar content and other conditions and the apple farmers change cultivation conditions of the following year as needed.

On the other hand, if sugar content data of preharvest apples on trees can be measured, it becomes possible to provide support for cultivation by predicting sugar content data of apples at the time of their shipping to push the sugar content of those apples closer to a desired level during their cultivation.

[Problems to be solved by the invention]

The present invention was created taking such circumstances into consideration and aims to provide support for cultivation based on the data to push the sugar content of those apples closer to a desired level by measuring sugar content data of preharvest apples on trees and by predicting sugar content data of apples at the time of their shipping.

[Solution for the Problem to be solved]

In the present invention sugar content data of preharvest apples on trees is measured with a portable sugar content sensor for apples. The said sugar content sensor for apples measures a sugar content of those apples by irradiating near-infrared lights on apples and performing spectroscopic analyses of reflected lights. Although this principle of measurement is the same as the conventional measurement of sugar content of apples performed at the time of their shipping, in the present invention sugar content data of preharvest apples on trees is measured since a portable sugar content sensor for apples has been developed in response to the progress of sensor technology. The said sugar content sensor for apples is equipped with the communication function and can transmit measured sugar content data to the server directly or via a terminal of an apple farmer.

This sugar content data of apples is used for analysis and prediction by the server.

The server makes analyses through the following steps (1) - (4).

(1) A step in which a receiving unit of the server receives during a specified period daily sugar content data of preharvest apples on trees from terminals of a plurality of apple farmers via the network.

(2) A step in which the receiving unit of the server receives data on meteorological conditions for specified periods before apples are harvested and sugar content data of apples at the time of their shipping. Meteorological conditions are selected arbitrarily from the amount of sunlight, temperature, the amount of rainfall, humidity, etc. Meteorological conditions may be those at a place where apples are cultivated or at a point or an area where the server is installed. If the place where apples are cultivated and the point where the server is installed are not so far as to cause differences in meteorological conditions, those at the point or area where the server is installed may be adopted. Moreover, sugar content data of apples at the time of their shipping is measured for grading as in the past.

(3) A step in which a memory unit of the server stores the received sugar content data of apples for specified periods and data on meteorological conditions, and the sugar content data of apples at the time of their shipping as one combination. The server accumulates a sufficient amount of data on the said combination as actual values in order to obtain adequate results of the analyses explained in (4).

(4) A step in which an analyzing unit of the server analyzes, based on the said data stored in the memory unit, the relationship between sugar content data of apples for specified periods before they are harvested and data on meteorological conditions, and sugar content data of apples at the time of their shipping by means of machine learning. An arbitrary technique such as deep learning of neural networks is used for this machine learning. For example, neural networks are configured in a way that sugar content data of apples measured prior to a point X days before their harvest and data on meteorological conditions before their harvest are input in the input layer and sugar content data of apples at the time of their shipping is output from the output layer. Weights between neurons of the neural networks are optimized by means of supervised learning using analytical data obtained by tagging the input dada in the input layer and the output data from the output layer.

Then, a prediction by the server is made through the following steps (5) - (8).

(5) A step in which the receiving unit of the server receives sugar content data of preharvest apples on trees for specified periods from terminals of apple farmers via the network.

(6) A step in which the receiving unit of the server receives data on past meteorological conditions to date and data on predicted meteorological conditions for the future from the present to the date of shipping. Meteorological conditions are selected arbitrarily from the amount of sunlight, temperature, the amount of rainfall, humidity, etc. in the same manner as (2) above. However, the receiving unit receives predicted future meteorological conditions in this process for the purpose of making a prediction described later.

(7) A step in which the memory unit of the server stores the received data.

(8) A step in which a prediction unit of the server, based on the relationships obtained by performing the analyses described in the process (4), predicts sugar content data of apples at the time of future shipping using data stored therein by inputting the data on measured sugar content of apples for specified periods and the data on past and future meteorological conditions. In the case of the neural networks mentioned in (4), a prediction is made by inputting sugar content data of apples measured prior to the point of X days before the harvest and data on meteorological conditions prior to the point of X days before the harvest as well as data on meteorological conditions after the said point of X days before the harvest in the input layer and by outputting sugar content data of apples at the time of their shipping from the output layer.

Then, the server transmits predicted sugar content data of apples at the time of their shipping to terminals of apple farmers via the network. The apple farmers examine if they need to change cultivation conditions, etc. based on the predicted sugar content data of apples at the time of their shipping.

[Effect of Invention]

The present invention can provide support for cultivation based on the data to push the sugar content of those apples closer to a desired level by measuring sugar content data of preharvest apples on trees and by predicting sugar content data of apples at the time of their shipping.

[Conclusion]

The invention of claim 1 does not fall under "invention."

The invention of claim 2 does not fall under "invention."

The invention of claim 3 falls under "invention."

[Explanation]

- Claim 1

Mere presentation of information (where the feature resides solely in the content of the information, and the main object is to present information), such as presentation of information (presentation per se, means for presentation or method of presentation) in which a technical

feature does not reside, does not fall under "invention" ("creation of the technical idea utilizing a law of nature") mentioned in the main paragraph of Article 29(1).

Since Claim 1 does not specify any means for or a method of presenting sugar content data of apples, the sugar content data of apples of Claim 1 is considered to be characterized only in the content of information that "sugar content data of preharvest apples on trees measured by a portable sugar content sensor for apples which performs reflective near-infrared spectroscopic analyses." Therefore, the sugar content data of apples of Claim 1 does not have technical features in the presentation of information (presentation per se, means for presentation or method of presentation), its feature resides solely in the content of the information, and its main object is to present information.

Therefore, since the sugar content data of apples of Claim 1 is mere presentation of information, it is not a creation of the technical idea utilizing a law of nature and thus does not fall under "invention."

- Claim 2

Although Claim 2 identifies the sugar content data of apples of Claim 1 as "received by a receiving unit of a server and stored in a memory unit of the server," it does not specify any means for or method of presenting the sugar content data of apples. Therefore, it is still considered that its feature resides solely in the content of information. Therefore, the sugar content data of apples of Claim 2 does not have technical features in the presentation of information (presentation per se, means for presentation or method of presentation), its feature resides solely in the content of the information, and its main object is to present information.

Therefore, since the sugar content data of apples of Claim 2 is mere presentation of information, it is not a creation of the technical idea utilizing a law of nature and thus does not fall under "invention."

- Claim 3

The invention of Claim 3 is a method for predicting sugar content data of apples using the computer software. The method for predicting sugar content data of apples comprises "a step in which an analyzing unit of the server analyzes the relationship between sugar content data of preharvest apples for specified periods and data on meteorological conditions, and sugar content data of apples at the time of their shipping, based on past performance; a step in which the receiving unit of the said server receives the sugar content data of apples for specified periods as described in Claim 1 (sugar content data of preharvest apples on trees measured by a portable sugar content sensor for apples which performs reflective near-infrared spectroscopic analyses); and a step in which a prediction unit of the said server predicts and outputs sugar content data of apples at the time of future shipping using the said received sugar content data of apples for specified periods and data on past and future meteorological conditions as inputs, based on the said analyzed relationships." Therefore, the invention of Claim 3 is what concretely performs information processing based on the technical properties such as chemical or biological properties

of apples.

Therefore, the invention of Claim 3 is a creation of the technical idea utilizing a law of nature as a whole and thus falls under "invention."

(Supplementary explanation)

Since the determination whether or not the inventions of Claim 3 fall under "inventions" is judged in accordance with "Examination Guidelines Part III, Chapter 1: Eligibility of Invention and Industrial Applicability," and thus is not examined from a viewpoint of the computer software.

[Measures of the applicant]

It is understood that regarding the sugar content data of apples its feature resides solely in the content of the information as far as the description etc. are referred to. Therefore, the sugar content data of apples of Claims 1 and 2 cannot overcome the reason for refusal.

[Case 5] Those regarded/not regarded as technical ideas

Title of Invention

Training data and method for generating images for training data

What is claimed is:

[Claim 1]

Training data for training a discriminator, the training data consisting of images for training data generated by combining surgical instrument images indicating surgical instruments with radiological images including the human body, and correct data indicating the area of surgical instruments in the images for training data, wherein when radiological images including the human body are input, the area of surgical instruments in the input radiological image is determined.

[Claim 2]

A method for generating images for training data for training a discriminator that determines the area of surgical instruments in target images when the target images are input,

the method comprising a step of obtaining radiological images including the human body and surgical instrument images indicating surgical instruments;

and a step of generating images for training data corresponding to the target images by combining the surgical instrument images with the radiological images, performed by an image generation device for training data.

Overview of the description

[Technical field]

The invention relates to a method for creating images for training data for constructing a discriminator that determines the area of surgical instruments in input radiological images by machine learning.

[Background Art]

When performing surgical procedures on patients, various surgical instruments are used, such as gauze to control bleeding, sutures, and needles to close wounds or incisions. Such surgical instruments can cause serious complications if left in the patient's body after surgery. Therefore, it is necessary to ensure that no surgical instruments remain in the patient's body after surgery.

Conventionally, radiological images are taken of the patient after surgery, and the surgeon or nurse visually checks to see if gauze or other surgical instruments remain in the patient's body.

However, after a long surgery, both the surgeon and the nurses are tired and may miss the surgical instruments left behind.

Therefore, in order to assist surgeons and nurses, it was desired to construct a discriminator to which radiological images of patients are input to automatically determine the area of surgical instruments in the input radiological images.

[Problems to be Solved by the Invention]

A large amount of training data must be collected to create a discriminator as described above by machine learning, but actual radiological images in which surgical instruments such as gauze remain in the patient's body are extremely rare, making it difficult to collect a large amount of training data.

The present invention has been conceived in view of such situation and aims to easily create a sufficient number of images for training data to train a discriminator that determines the area of surgical instruments in input radiological images including the human body.

[Means for Solving the Problem]

In the present invention, the images for training data T0 for training the above discriminator are generated by obtaining radiological images G0 including the human body and surgical instrument images M0 indicating surgical instruments, and combining the obtained radiological images G0 and surgical instrument images M0.

[Effect of Invention]

A sufficient number of images for training data T0 can be easily prepared to train the above discriminator, and as a result, a discriminator with high detection accuracy of surgical instruments can be constructed.

[Mode for carrying out the invention]

The image processing device of the present invention comprises an image acquisition unit, a composition unit, a learning unit, a detection unit, and a display control unit.

The image acquisition unit obtains radiological images G0, including any subject, from an image storage system via the I/F network to generate images for training data T0.

The image acquisition unit also obtains surgical instrument images M0 indicating surgical instruments from the image storage system to generate the images for training data T0. The surgical instrument image M0 is a three-dimensional image that indicates surgical instruments and is created using computer graphics or the like.

When target radiological images G1 are input, the composition unit combines the radiological images G0 and the surgical instrument images M0, thereby generating images for training data T0 for training a discriminator that determines the area of surgical instruments in the radiological images G1. The composition unit combines the radiological images G0 and the surgical instrument images M0 to generate the images for training data T0.

The composition unit also generates a plurality of images for training data T0 by combining the surgical instrument images M0, whose position, angle and size are modified, with the radiological images G0 for training the discriminator described below. This generates images for training data T0, in which the surgical instrument images M0 are combined with the radiological images G0 as if they were radiographed.

The learning unit trains the discriminator to determine the area of surgical instruments in the input radiological images using the training data including the images for training data T0 and

the correct data in which the area of surgical instruments in the images for training data T0 is identified, and the training data consisting of the radiological images without surgical instruments. A sufficient number of images are prepared as training data for machine learning.

As a discriminator, machine learning models can be used. Examples of machine learning models include a neural network model. A convolutional neural network is used as the discriminator in the embodiment.

The discriminator is trained to output, when the images for training data T0 contained in the training data are input, the probability that each pixel in the images for training data T0 is the area of surgical instruments.

The trained discriminator is applied to the detection unit. When the target radiological images G1 are input to the detection unit, the discriminator extracts the area of surgical instruments contained in the radiological images G1 to be detected to detect the area of surgical instruments.

The display control unit shows the radiological images G1 on the display, highlighting the area of surgical instruments detected by the detection unit from the radiological images G1 to be detected.

Any surgical instrument used in surgery, such as suture needles, gauze, scalpels, scissors, drains, sutures, forceps, and stent grafts, may be subject to surgical instrument detection.

[Conclusion]

The invention of claim 1 does not fall under "invention."

The invention of claim 2 falls under "invention."

[Explanation]

Claim 1

Mere presentation of information (where the feature resides solely in the content of the information, and the main object is to present information), such as presentation of information (presentation per se, means for presentation or method of presentation) in which a technical feature does not reside, does not fall under "invention" ("creation of the technical idea utilizing a law of nature") mentioned in the main paragraph of Article 29(1).

The use of training data "to train a discriminator" as described in claim 1 is a very normal operation in machine learning of discriminators, so that the training data of claim 1 does not bring any technical features to learning means or methods for discriminators, and is considered to be characterized only in the content of information that it consists of "images for training data generated by combining surgical instrument images indicating surgical instruments with radiological images including the human body, and correct data indicating the area of surgical instruments in the images for training data." Therefore, the training data of claim 1 does not have technical features in the presentation of information (presentation per se, means for presentation or method of presentation), where feature resides solely in the content of the information, and the main object is to present information.

Therefore, the training data of claim 1 is a mere presentation of information, it is generally not a creation of the technical idea utilizing a law of nature, and thus does not fall under "invention."

Claim 2

Claim 2 states that "a step of obtaining radiological images including the human body and surgical instrument images indicating surgical instruments; and a step of generating images for training data corresponding to the target images by combining the surgical instrument images with the radiological images are performed by an image generation device for training data." Therefore, it can be said that specific calculation or processing of information depending on the purpose (intended use) of the subject matter of Claim 2 is implemented by concrete procedure through cooperation of software and hardware resources. Thus, the subject matter of Claim 2 constructs the operation method of specific information processing system depending on intended use through cooperation of software and hardware resources.

Therefore, since it can be said that information processing by the software is concretely realized by using hardware resources, the subject matter of Claim 2 is a creation of a technical idea utilizing the laws of nature, and falls under "invention."

[Case 31] Learning System Comprising On-vehicle Devices and a Server

Title of Invention

Learning System Comprising On-vehicle Devices and a Server

What is claimed is:

[Claim 1]

A learning system comprising a plurality of on-vehicle devices mounted on a plurality of vehicles respectively and a server that communicates with the said plurality of on-vehicle devices via a network,

wherein the said plurality of on-vehicle devices is comprised of:

an image recognition unit that executes image recognition, based on specific parameters, using image data around the vehicle taken by an on-vehicle camera;

a provision unit that provides the said server with the image data used for the said image recognition as data for learning;

an acquisition unit that acquires data to update the said parameters provided from the said server; and

an updating unit that updates the said parameters based on the said acquired data,

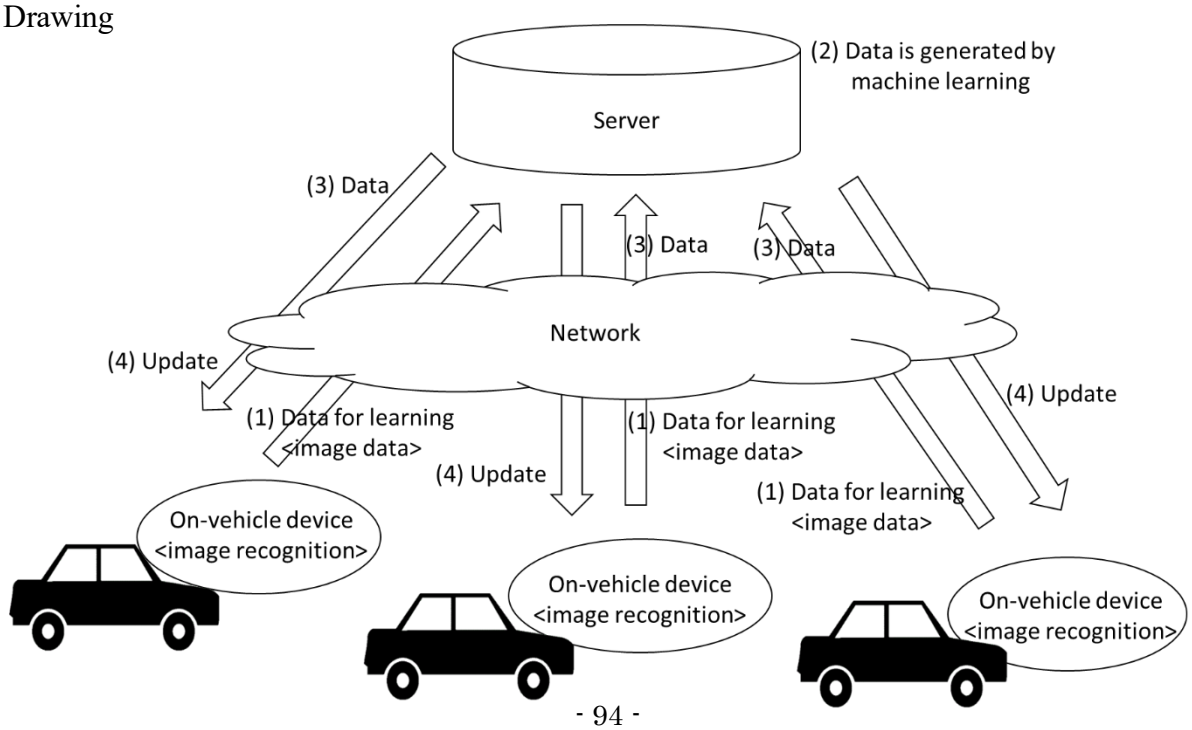
wherein, the said server is comprised of:

an acquisition unit that acquires the said data for learning provided from the said plurality of on-vehicle devices:

a learning unit that carries out machine learning based on the said data for learning and generates data for updating the said parameters; and

a provision unit that provides the said plurality of on-vehicle devices with the said data for updating.

Drawing



Overview of the description

[Background Art]

An on-vehicle device performs image recognition to recognize vehicles, pedestrians and white lines drawn on roads around own vehicle.

[Problems to be solved by the invention]

In the development stage of these on-vehicle devices, it has been tried to improve image recognition performance by machine learning. However, after products are shipped, no effort for improving image recognition performance has been made.

The present invention has been conceived in view of the above problem and aims to provide a learning system that allows image recognition performance to be improved after the on-vehicle devices are shipped.

[Solution for the Problem to be solved]

An on-vehicle device is equipped with an image recognition unit and performs image recognition of vehicles, pedestrians and white lines drawn on roads around the vehicle based on image data around the vehicle taken by an on-vehicle camera. Image recognition is performed by algorithms such as support vector machines and neural networks that have specific parameters. Weights of these support vector machines and neural networks are updated by machine learning described later.

The on-vehicle device is equipped with a provision unit that, when it performs image recognition, provides a server with image data used for the image recognition as data for learning via a network. The frequency of provision can be set by a person skilled in the art as appropriate. The on-vehicle device provides image data, for example, every time when a certain amount of image data is accumulated.

On the other hand, the server is equipped with an acquisition unit and a learning unit that acquire data for learning provided from a plurality of the on-vehicle devices, perform machine learning to improve image recognition performance based on the data for learning and generate data to update parameters for image recognition. Machine learning is performed by means of unsupervised learning or supervised learning. In the case of unsupervised learning, a large amount of data collected from the on-vehicle devices (unsupervised data) is used to learn unsupervised features. Features refer to expressions that can express unsupervised data in the best mode (for example, linear combination of image pixels). In the case of supervised learning, it is necessary to create supervised data corresponding to each data for learning (for example, labels indicating the existence of pedestrians and the positions of white lines recognized by image recognition). Such work is carried out by operators who operate the server.

The server is equipped with a provision unit to provide each of the on-vehicle devices with data to update the said parameters via the network. The frequency of provision can be set by a person skilled in the art as appropriate. The server provides data on a regular basis, for example every week or every month.

The on-vehicle device is equipped with an acquisition unit and an updating unit to

acquire data for parameters provided from the server, update parameters for image recognition based on the data and perform image recognition based on updated parameters.

Moreover, the provision unit of the on-vehicle device may generate data indicating running conditions of own vehicle such as the vehicle's speed, steering angle and turn signal control as data on running conditions and provide the server with the data on running conditions when image recognition is performed together with image data as data for learning.

In this case, the learning unit of the server classifies data for learning based on the data on running conditions and generates data for updating parameters by performing machine learning depending on each running condition. By this way, high-precision image recognition is realized in accordance with running conditions. Specifically, when the vehicle is running at high speed, changes in positions of vehicles and pedestrians therearound (principally changes in positions in image in the vertical directions) become large among images taken continuously compared to the time when the vehicle is running at low speed. Similarly, when a steering angle is large, that is, a vehicle is turning around, changes in positions of vehicles and pedestrians therearound (principally changes in positions in image in the lateral directions) become large among images taken continuously compared to the time when a vehicle is running straight. Furthermore, when a turn signal is controlled during high-speed running, that is, a vehicle is changing a driving lane, changes in positions of white lines become large among images taken continuously. Therefore, it is not appropriate to perform uniform image recognition without taking into account running conditions such as that the vehicle is running at high speed or low speed, turning around or running straight and/or changing a driving lane. In the present invention, in order to realize high-precision image recognition depending on running conditions, the learning unit of the server carries out the machine learning and generates data for updating parameters depending on each running condition while the acquisition unit of the on-vehicle device acquires the data and the updating unit updates parameters based on the data.

As described above, machine learning depending on each running condition has a particularly-advantageous effect in a system comprising a plurality of on-vehicle devices and a server compared to a system that performs machine learning in one on-vehicle device. That is, in the system comprising a plurality of on-vehicle devices and a server, a large amount of data for learning is provided to the server, and sufficient data for learning exists even when it is classified for each running condition. Therefore, in order to realize high-precision image recognition even in a rare running condition for some vehicles, for example, in a running condition that a vehicle that does not usually run on a highway actually runs on a highway and changes a driving lane, such a system can appropriately update parameters of image recognition parameters by means of effective machine learning.

[State of the art (Prior art, well-known art, etc.)]

Cited invention 1 (Invention disclosed in the cited document 1 (D1)):

A learning system comprising an on-vehicle device mounted on a vehicle,

wherein the on-vehicle device is comprised of:

an image recognition unit that executes image recognition, based on specific parameters, using image data around the vehicle taken by an on-vehicle camera;

a provision unit that provides image data used for the said image recognition as data for learning;

an acquisition unit that acquires the said data for learning provided;

a learning unit that performs machine learning based on the said data for learning to update the said parameters;

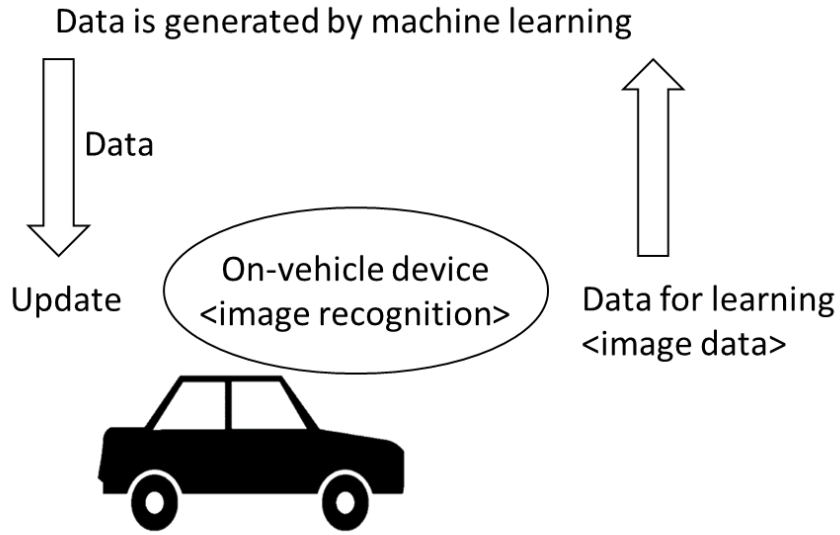
a provision unit that provides data to update the said parameters;

an acquisition unit that acquires data to update the said parameters;

an updating unit that updates the said parameters based on the said acquired data.

(Problems to be solved)

Image recognition performance is improved by updating parameters used for executing image recognition, after on-vehicle devices are shipped.



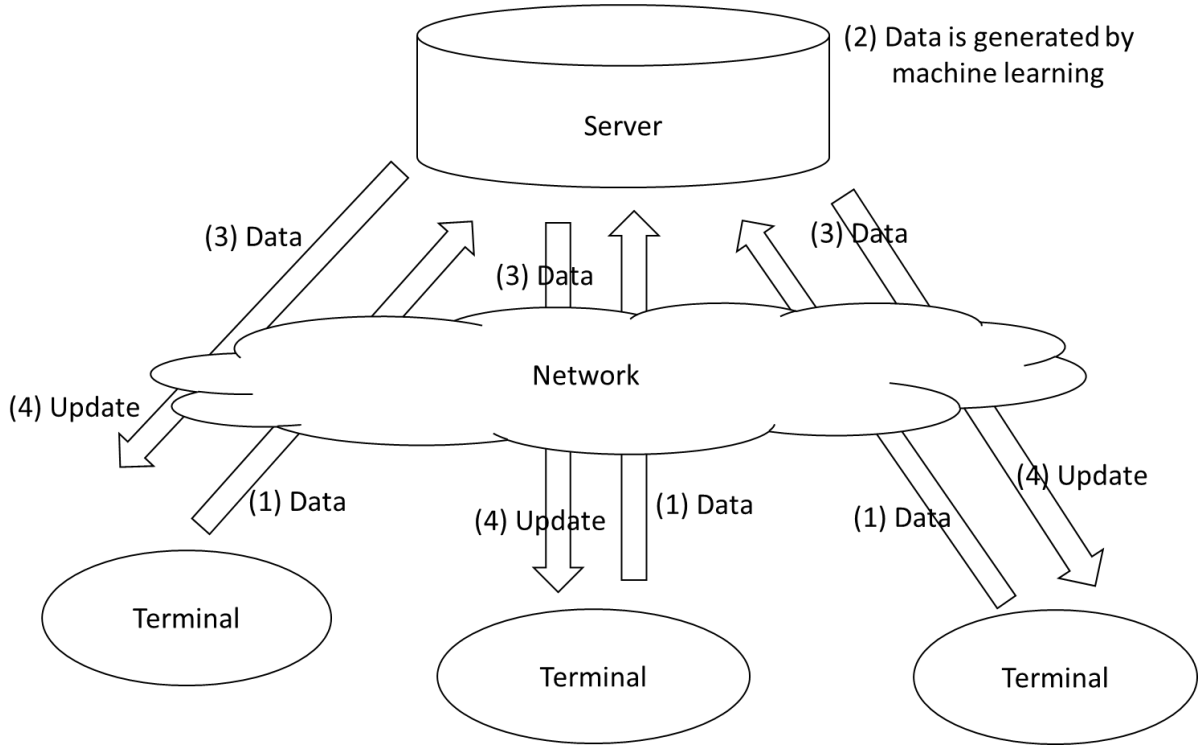
Well-known art:

For improving functions of various terminals including mobile type terminals,

a server generates data for updating the computer programs or the setting values of the computer programs collectively and provides a plurality of terminals therewith by making an analysis based on data that were used for processing of the programs and were provided from the plurality of terminal devices to the server via a network.

(Problems to be solved)

Functions of computer programs are improved after terminals are shipped.



[Conclusion]

The invention of claim 1 lacks an inventive step.

[Overview of Reason for Refusal]

- Claim 1

When the invention of Claim 1 and the cited invention 1 are compared, they are different in the following point.

(Difference)

The invention of Claim 1 is a learning system comprising a plurality of on-vehicle devices mounted on a plurality of vehicles respectively and a server that communicates with the said plurality of on-vehicle devices via a network, wherein, the said plurality of on-vehicle devices are comprised of a provision unit that provides the said server with data for learning and an acquisition unit that acquires data for updating parameters provided from the said server, and the said server is comprised of an acquisition unit that acquires data for learning provided from the said plurality of on-vehicle devices, a learning unit that carries out machine learning based on the said data for learning and generates data for updating the said parameters and a provision unit that provides the said plurality of on-vehicle devices with the said data for updating. On the other hand, the cited invention 1 is a learning system comprising an on-vehicle device, wherein, the said on-vehicle device is comprised of a learning unit that carries out machine learning based on data for learning and generates data for updating parameters, but the on-vehicle device is not a plurality of vehicles that are mounted on a plurality of vehicles respectively and the said on-vehicle device and a server are not comprised of a provision unit and an acquisition unit to provide

data each other and acquire data.

The above difference is now considered.

It is a well-known art that, for improving functions of various terminals including mobile type terminals, a server generates data for updating the computer programs or the setting values of the computer programs collectively and provides a plurality of terminals therewith by making an analysis based on data that were used for processing of the programs and were provided from the plurality of terminal devices to the server via a network.

The cited invention 1 and the well-known art have a common problem to be solved in that processing performance and functions of the computer software are improved after mobile-type devices on which the computer software is installed are shipped. Moreover, they have a common function that they generate data for updating the computer software based on data used for the processing thereof and update it based on the said generated data.

When the above-mentioned circumstances are considered comprehensively, a person skilled in the art could have easily conceived of applying the well-known art to the cited invention 1 and conceived of a configuration of the learning system comprising a plurality of on-vehicle devices mounted on a plurality of vehicles respectively and a server that communicates with the said plurality of on-vehicle devices via a network, wherein, the said plurality of on-vehicle devices are comprised of a provision unit that provides the said server with data for learning and an acquisition unit that acquires data for updating parameters provided from the said server, and the said server is comprised of an acquisition unit that acquires data for learning provided from the said plurality of on-vehicle devices, a learning unit that carries out machine learning based on the said data for learning and generates data for updating the said parameters and a provision unit that provides the said plurality of on-vehicle devices with the said data for updating.

Furthermore, an effect of the invention of Claim 1 that the image recognition performance can be improved after shipment is also to the extent that a person skilled in the art can predict.

[Explanation]
(Considered motivation)
(1) Similarity of problems to be solved

The cited invention 1 and the well-known art have a common problem to be solved in that processing performance and functions of the computer software are improved after mobile-type devices on which the computer software is installed are shipped.

(3) Similarity of functions

The cited invention 1 and the well-known art have a common function that they generate data for updating the computer software based on data used for the processing thereof and update it based on the said generated data.

[Measures of the applicant]

In Claim 1, the applicant makes an amendment to add the following points: the provision unit of the on-vehicle devices provides the server with data on running conditions together with image data as data for learning, and the learning unit of the server classifies data for learning into a plurality of groups based on the said data on running conditions, carries out machine learning and generates data for updating parameters depending on each running condition.

In addition, the applicant argues in the written opinion that high-precision image recognition can be realized depending on running conditions such as that a vehicle is at high speed or low speed, turning around or running straight and/or changing a driving lane, even in a rare running condition for some vehicles, for example, in a running condition that a vehicle that does not usually run on a highway actually runs on a highway and changes a driving lane.

By these measures, the above reasons for refusal are overcome.

[Case 32] Quality management program of manufacturing lines

Title of Invention

Quality management program of manufacturing lines

What is claimed is:

[Claim 1]

A quality management program of manufacturing lines causing a computer to realize:

a function of receiving data on inspection results of products that went through predetermined manufacturing processes and were inspected with regard to each of predetermined inspection items from inspection devices via a network and of storing it in a database;

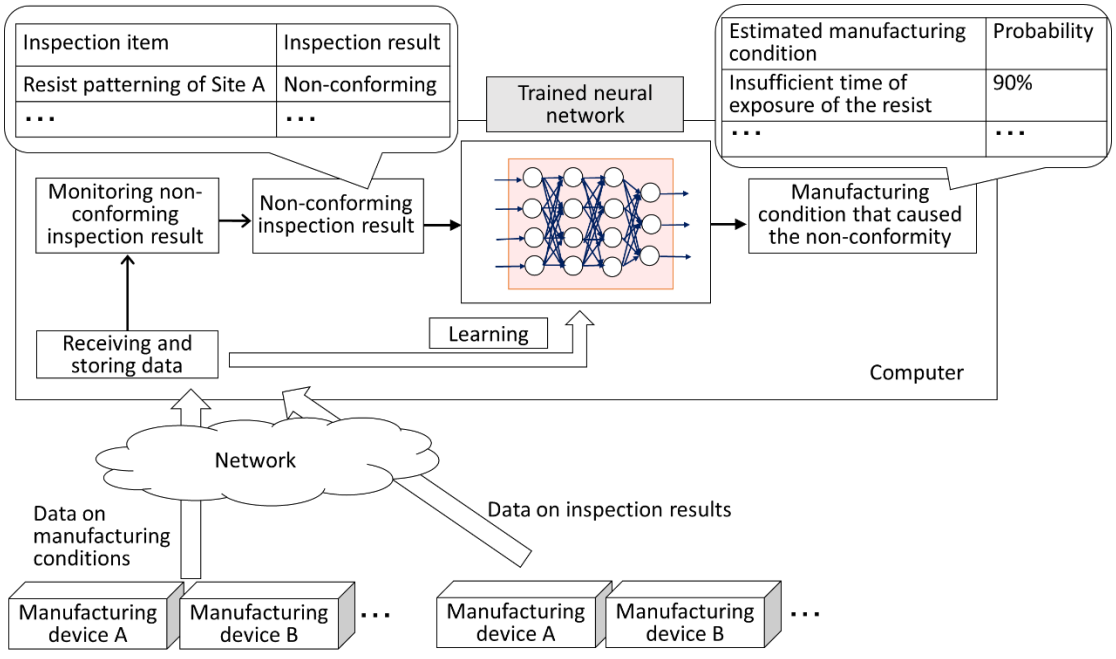
a function of receiving data on manufacturing conditions when the products were manufactured from manufacturing devices via a network and of storing it in the said database after associating it with the said data on inspection results;

a function of training a neural network by means of deep learning about a relationship between inspection results of the said data on inspection results stored in the said database and manufacturing conditions that caused non-conformity among the said data on manufacturing conditions;

a function of monitoring test results data stored in the said database; and

a function of estimating manufacturing conditions that caused the non-conformity using the said trained neural network when the non-conforming test result is found as a result of the said monitoring.

Drawing



Overview of the description

[Background Art]

Quality management of products in manufacturing lines of a variety of products is performed by sampling data of a small number of products from a large number of products manufactured and examine a relationship between their manufacturing conditions and their quality based on overall distribution and a degree of variations of sampled data of a small number of products. Currently, technologies such as monitoring network database have progressed so that it is relatively easy to integrally accumulate data on manufacturing conditions and inspection results of all products that have gone through manufacturing lines using barcodes or another type of data.

[Problems to be solved by the invention]

Though it will become possible to perform more advanced quality management by effectively using an enormous quantity of data on manufacturing histories, the data processing capabilities of humans are limited. Moreover, an analysis of non-conforming using detailed data relies largely on judgment or hunch of humans who have specific rules of thumb and skills for improvement. This inhibits effective utilization of data. Therefore, it is difficult to realize quality management through effective utilization of a large quantity of data on manufacturing histories by conventional methods relying on humans.

The present invention has been conceived in view of the above problems and aims to provide a quality management program of manufacturing lines capable of overcoming ambiguity caused by reliance on data processing capabilities, rules of thumb and hunch of humans, effectively using a large quantity of data and making highly-precise estimations.

[Solution for the Problem to be solved]

In a manufacturing line, products are manufactured based on specific manufacturing conditions. For example, in case of manufacture of semiconductor devices, the time of exposure, materials and amount of resists as well as materials, flow and pressure of process gas. Moreover, an inspection is carried out at an appropriate stage, such as after a predetermined manufacturing process completes. For example, in case of manufacture of semiconductor devices, such inspection items as patterning of the resists and the thickness of coated films are inspected.

A computer on which the quality management program of the present invention is executed receives data on inspection results of manufactured products from inspection devices and data on manufacturing conditions when the products were manufactured from manufacturing devices via a network, respectively, and they are associated to be stored in a database.

A neural network is trained by means of deep learning about a relationship between the stored data on inspection results and manufacturing conditions that caused non-conformity among data on manufacturing conditions. As the neural network is trained, weights between layers thereof are updated.

In the present invention, it is possible to multiply a variable forgetting coefficient γ by the said weights at the time of learning. A forgetting coefficient γ is set in the range of $0<\gamma<1$, and the closer this coefficient is to 0, the higher a degree that data is to be forgotten. A forgetting

coefficient γ is set by a bivariable function of γ=f(k, t1), wherein k quantitatively indicates the degree of change in characteristics of manufacturing devices across the ages and t1 indicates the time elapsed from the previous maintenance. The said degree of change k is set by a bivariable function of k=g(α, t2), wherein α indicates a type of manufacturing devices and t2 indicates the total operating time thereof, since k varies depending on a type of manufacturing devices and the total operating time thereof (for example, characteristics of some manufacturing devices start to deteriorate rapidly, as the total operating time increases). The use of such a forgetting coefficient γ makes it possible to learn reflecting recent data to a necessary degree in accordance with the degree of change in the characteristics of devices, with regard to manufacturing devices whose characteristics are prone to change across the ages. Moreover, it makes it possible to strongly forget data before the maintenance and principally learn data after the maintenance, with regard to manufacturing devices that are shortly after maintenance. By this way, it becomes possible to establish a trained neural network closer to the current condition and make a highly-precise estimation. ((Note) It is assumed that concrete function formulas of f(k, t1) and g(α, t2) are described in the description.)

On the other hand, data on inspection results is monitored and, in cases where any non-conforming inspection result is found, the trained neural network is used to estimate a manufacturing condition that caused the non-conformity.

[Effect of Invention]

Since the present invention estimate a manufacturing condition that caused non-conformity using the trained neural network that is trained by means of deep learning, a highly-precise estimation can be made.

[State of the art (Prior art, well-known art, etc.)]

Cited invention 1 (Invention disclosed in the cited document 1 (D1)):

A quality management program of manufacturing lines causing a computer to realize:

a function of receiving data on inspection results of products that went through predetermined manufacturing processes and were inspected with regard to each of predetermined inspection items from inspection devices via a network and of storing it in a database;

a function of receiving data on manufacturing conditions when the products were manufactured from manufacturing devices via a network and of storing it in the said databased after associating it with the said data on inspection results;

a function of machine learning about a relationship between inspection results of the said data on inspection results stored in the said database and manufacturing conditions that caused non-conformity among the said data on manufacturing conditions;

a function of monitoring test results data stored in the said database; and

a function of estimating manufacturing conditions that caused the non-conformity using the said machine learning result when the non-conforming test result is found as a result of the said monitoring.

(Problems to be solved)

Making a highly-precise estimation of manufacturing conditions that caused non-conformity.

Well-known art:

In the technical field of machine learning, training a neural network by means of deep learning and making an estimation using this trained neural network.

(Problems to be solved)

Making a highly-precise estimation.

[Conclusion]

The invention of claim 1 lacks an inventive step.

[Overview of Reason for Refusal]

When the invention of Claim 1 and the cited invention 1 are compared, they are different in the following point.

(Difference)

The invention of claim 1 trains a neural network by means of deep learning and estimates manufacturing conditions that caused the non-conformity using the said trained neural network, while the cited invention 1 performs machine learning and estimates manufacturing conditions that caused the non-conformity using the said machine learning result, but is not clear whether the machine learning has a neural network be trained by means of deep learning.

The above difference is now considered.

In the technical field of machine learning, training a neural network by means of deep learning and making an estimation using this trained neural network is a well-known art. The cited invention 1 and the well-known art have a common problem of making a highly-precise estimation using machine learning results. Moreover, they have a common function that they perform machine learning to make an estimation using the machine learning results.

When the above circumstances are taken into consideration comprehensively, a person skilled in the art could have easily conceived of applying the well-known art to the cited invention 1 and conceived of training a neural network by means of deep learning and estimating manufacturing conditions that caused non-conformity using the trained neural network.

Furthermore, an effect of the invention of Claim 1 that it becomes possible to make a highly-precise estimation, because manufacturing conditions that caused non-conformity are estimated by using a trained neural network by means of deep learning, is also to the extent that a person skilled in the art can predict.

[Explanation]

(Considered motivation)
(1) Similarity of problems to be solved

The cited invention 1 and the well-known art have a common problem that they make a highly-precise estimation using machine learning results.

(3) Similarity of functions

The cited invention 1 and the well-known art have a common function that they perform machine learning and make an estimation using the machine learning results.

[Measures of the applicant]

In Claim 1, the applicant makes an amendment to add the following points: a variable forgetting coefficient γ is multiplied by the weights of the neural network at the time of learning, the said forgetting coefficient γ is set by a bivariable function of γ=f(k, t1), wherein k quantitatively indicates the degree of change in characteristics of manufacturing devices across the ages and t1 indicates the time elapsed from the previous maintenance, and the said degree of change k is set by a bivariable function of k=g(α, t2), wherein α indicates a type of manufacturing devices and t2 indicates the total operating time thereof.

In addition, the applicant argues in the written opinion the following effect of the present invention: the use of such a forgetting coefficient γ makes it possible to learn reflecting recent data to a necessary degree in accordance with the degree of change in the characteristics of devices, with regard to manufacturing devices whose characteristics are prone to change across the ages. Moreover, it makes it possible to strongly forget data before the maintenance and principally learn data after the maintenance, with regard to manufacturing devices that are shortly after maintenance. By this way, it becomes possible to establish a trained neural network closer to the current condition and make a highly-precise estimation.

By these measures, the above reason for refusal is overcome.

[Case 2-13] Data Structure of Dialogue Scenarios in Voice Interactive System

Title of Invention

Data Structure of Dialogue Scenarios in Voice Interactive System

What is claimed is:

[Claim 1]

A data structure of dialogue scenarios utilized in a voice interactive system composed of a client's device and a server, comprising:

unit IDs that identify dialogue units constituting dialogue scenarios;

messages including contents of utterances and information presented to users;

a plurality of candidate answers in response to answers from users;

information on communication mode; and

a plurality of branch information mapped to each of the candidate answers and information on communication mode, wherein the branch information indicates the following dialogue unit which contains messages corresponding to the said candidate answers and whose data size is corresponding to the said information on communication mode;

wherein, the said data structure of dialogue scenarios is utilized for the following processing performed by the said client's device:

(1) Outputting a message included in the current dialogue unit;

(2) acquiring an answer from the user in response to the said message;

(3) specifying the said candidate answer based on the answer from the said user;

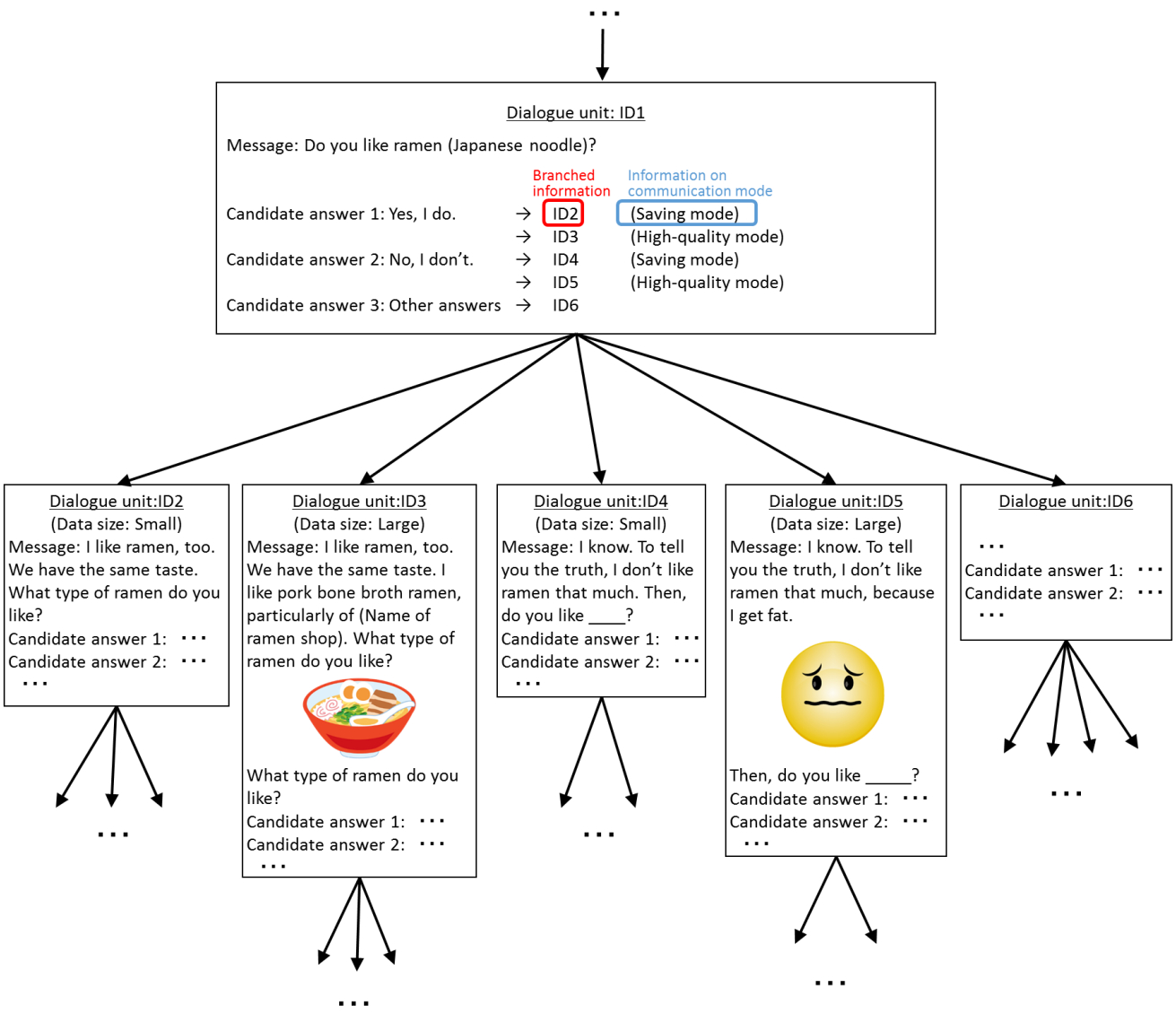
(4) selecting one branch information based on the said candidate answer and information on communication mode; and

(5) receiving from the server a following dialogue unit indicated by the selected branch information.

[Claim 1] Falls under "invention."

Drawing

[Fig. 1]



Overview of the description

[Background Art]

In recent years, research and development have progressed aiming at realization of interactive artificial intelligence (AI) that gives users a feeling of actual conversations or communications. The present invention relates to a data structure of dialogue scenarios utilized in voice interactive systems to realize such interactive AI.

As one technique of voice interactive systems, we have a technique of managing contents of dialogues based on dialogue scenarios. A dialogue scenario maps the subsequent scenario to each of candidate answers from a user, and a dialogue is forwarded by selecting one of the scenarios in response to an answer from the user. For example of dialogue scenarios, in the case where a user is asked, "do you like ramen?", a voice dialogue is performed by selecting

different scenarios according to positive answers (the user likes ramen) or negative answers (the user does not like ramen) from the user. When a dialogue scenario is created, it is possible to utilize a collection of natural and human dialogue patterns generated by collecting corpus data on actual dialogues from comments posted on websites or social networking services and by analyzing and learning such data with the use of natural language processing technologies such as morphological analysis and syntax analysis.

Voice interactive systems are widely utilized in smartphones, etc. In this case, dialogue scenarios are usually managed by voice dialogue servers.

[Problems to be solved by the invention]

However, conventional voice interactive systems do not give any consideration to the capacity of communications with servers. The monthly capacity of communications is often restricted in the case of communication systems including smartphones. The capacity of communications differs from one price plan to another selected by users. While some users whose monthly capacity of communication is small want to enjoy voice dialogues consuming a small capacity of communications, other users whose monthly capacity of communications is large expect to enjoy high-quality voice dialogues.

The present invention aims to provide a data structure that allows users to select dialogue scenarios adapted to communication capacities they look for.

[Description of the embodiments]

(Overall Structure)

A dialogue scenario describes how a dialogue continues in the tree shape and one unit of dialogue is herein called “dialogue unit.” The overall dialogue scenario is stored in a memory part of a server and sent to a client’s terminal by dialogue unit. The client’s terminal is equipped with a well-known composition such as CPU, memory, touch screen, microphone and speaker. The well-known composition realizes various functions including the function to communicate with the server, the function to store dialogue units received from the server, the function of playing messages included in dialogue units in the form of audio output and image display, and the function of receiving answers from users to messages in the form of voice, character entry, etc.

(Data Structure)

Fig. 1 illustrates one example of data structure of a dialogue scenario. Each of the dialogue units that constitutes the dialogue scenario contains data including, unit IDs, messages indicating contents of utterances to users and information presented, a plurality of candidate answers in response to answers from users, information on communication mode (“saving mode” or “high-quality mode”) and a plurality of branch information mapped to each of the candidate answers and information on communication mode, wherein the branch information indicates the following dialogue unit which contains messages corresponding to the said candidate answers and whose data size is corresponding to the said information on communication mode. The said messages may be mere contents of utterances to be played in audio (Dialogue ID2 or ID4 in Fig. 1) or presented information such as images to be displayed together with audio output

reproduction (Dialogue ID3 or ID5 in Fig. 1). Thus, the data size of dialogue units differs greatly depending on contents of messages included in dialogue units. In cases where the data size of following dialogue units indicated by the branch information is small, “saving mode” is mapped to the branch information. In cases where the data size of dialogue units indicated by the branch information is large, “high-quality mode” is mapped to the branch information for management. By this way, a plurality of options can be offered as candidates of following dialogue units in response to one candidate answer, in accordance with the capacity of communications.

(Information Processing in Voice Interactive System)

Firstly, after one dialogue unit is distributed to a client’s terminal, a message in the dialogue unit is played with the client’s terminal. When the client’s terminal acquires an answer from the user to the message, the candidate answer is specified based on the answer. The specification is executed, for example, by specifying the most similar candidate answer to the answer from the user through a matching of strings relating to the answer from the user with strings relating to candidate answers. Then, one branch information is selected from a plurality of branch information corresponding to the specified candidate answer. The details of how to select branch information will be described below. When the selected branch information is sent to the server, a following dialogue unit indicated by the branch information is sent to the client’s device from the server. A voice interactive system is realized by repeating this processing.

(Selection of Branch Information)

In the present voice interactive system, the communication mode of clients’ terminals is set as “saving mode” or “high-quality mode.” A communication mode may be set automatically in accordance with price plans of clients’ terminals or the status of communications, or manually by users. It is also possible to switch a mode where necessary during voice dialogues.

In cases where “saving mode” is set for clients’ terminals, branch information mapped to “saving mode” is selected, while in cases where “high-quality mode” is set, branch information mapped to “high-quality mode” is selected. By this way, in cases where “saving mode” is set, voice dialogues may be realized in a small communication capacity, since dialogue units whose data size is small are sent sequentially to the clients’ devices. On the other hand, in cases where “high-quality mode” is set, the user may enjoy high-quality voice dialogues, since dialogue units whose data size is large are sent sequentially to the clients’ devices.

(Other Embodiments)

In the above embodiment, the case where there are only two communication modes, “saving mode” and “high-quality mode” is explained, but not limited thereto. More detailed setting of communication capacity may be allowed by offering three or more communication modes.

[Conclusion]

The inventions of claim 1 falls under "invention."

[Explanation]
- Claim 1

It can be said that the data structure of Claim 1 enables information processing, that is for voice dialogues based on branch information included in dialogue units, from the statement of Claim 1 that "the said data structure of dialogue scenarios is utilized for the following processing performed by the said client's device:

(1) Outputting a message included in the current dialogue unit;

(2) acquiring an answer from the user in response to the said message;

(3) specifying the said candidate answer based on the answer from the said user;

(4) selecting one branch information based on the said candidate answer and information on communication mode; and

(5) receiving from the server a following dialogue unit indicated by the selected branch information."

Since the data structure has similar properties to the computer program in that it defines information processing performed in voice interactive systems, it is equivalent to the computer program (computer software).

Moreover, it can be determined, from the statement of Claim 1, that computing or processing of specific information in accordance with its purpose of use, that is, voice dialogues in accordance with branch information included in dialogue units, is realized by concrete means or procedures, that is, a series of information processing by a voice interactive system composed of the server and clients' devices by means of the collaboration between the computer software (data structure equivalent to the computer program) and hardware resources. The data structure is thus determined to establish an operating method of the specific information processing device in accordance with the purpose of use by means of the collaboration between the computer software and hardware resources.

Therefore, as information processing prescribed by the data structure equivalent to the computer program is concretely realized utilizing hardware resources, the data structure of Claim 1 is a creation of the technical idea utilizing a law of nature and thus falls under "invention."

[Case 2-14] Trained Model for Analyzing Reputations of Accommodations

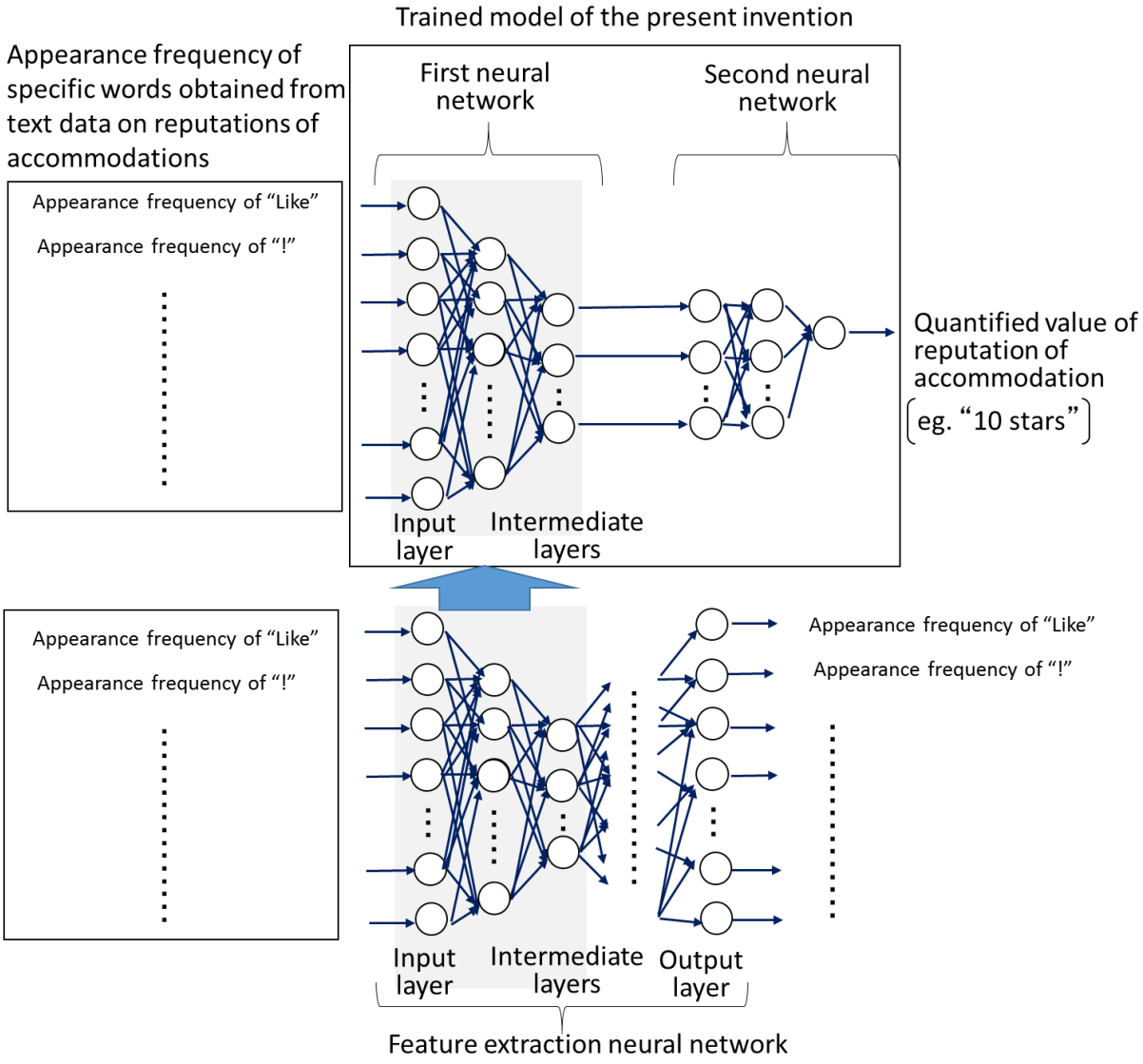
Title of Invention

Trained Model for Analyzing Reputations of Accommodations

What is claimed is:

[Claim 1] A trained model for causing a computer to function to output quantified values of reputations of accommodations based on text data on reputations of accommodations, wherein; the model is comprised of a first neural network and a second neural network connected in a way that the said second neural network receives output from the said first neural network; the said first neural network is comprised of an input layer to intermediate layers of a feature extraction neural network in which the number of neurons of at least one intermediate layer is smaller than the number of neurons of the input layer, the number of neurons of the input layer and the number of the output layer are the same, and weights were trained in a way each value input to the input layer and each corresponding value output from output layer become equal; weights of the said second neural network were trained without changing the weights of the said first neural network; and the model causes the computer function to perform a calculation based on the said trained weights in the said first and second neural networks in response to appearance frequency of specific words obtained from the text data on reputations of accommodations input to the input layer of the said first neural network and to output the quantified values of reputations of accommodations from the output layer of the said second neural network.	[Claim 1] Falls under "invention." (Falls under "invention" as a "program", even though the claimed subject matter is described as a "trained model.")

Drawing



Overview of the description

[Background Art]

A neural network, which has a computer function as a computing unit to calculate output in response to certain input, is capable of performing complicated information processing at high speed by being trained from a number of actual examples. Therefore, people intend to use neural networks for various purposes in such fields as image recognition, voice recognition, voice synthesis and automated translation.

Generally, in cases where neural networks are utilized in new areas, in many cases it is not clear what should be input as the input feature values, therefore, it is necessary to carefully review what should be selected as the input feature values accordingly.

In order to analyze text data on reputations of accommodations such as hotels posted on travel review sites with neural networks, it is not straightforward to select the input feature values,

because the appearance frequencies of a variety of words (“Like”, “!”, etc.) included in the text data can be considered as the candidate input feature values.

[Problems to be solved by the invention]

The present invention has been conceived in view of the above problems into consideration and aims to accurately analyze reputations of accommodations even if the input feature values are not properly pre-selected.

[Solution for the Problem to be solved]

The trained model of the present invention aims to cause a computer to function to output quantified values of reputations of accommodations based on text data on reputations of accommodations and is comprised of a first neural network and a second neural network connected in a way that the second neural network receives output from the first neural network. The trained model is supposed to be utilized as a program module which constitutes a part of artificial intelligence software.

The trained model of the present invention is utilized in a computer equipped with a CPU and a memory. Specifically, the CPU of the computer operates, in accordance with instructions from the trained model stored in the memory, in a way that it performs a calculation based on trained weights and response functions in the first and second neural networks in response to data input to input layers of the first neural network (appearance frequency of specific words obtained from text data of reputations of accommodations, e.g. by performing morphological analyses) and outputs results from output layers of the second neural network (quantified values of reputations, e.g. “10 stars”).

The first neural network is comprised of an input layer to intermediate layers of a feature extraction neural network. This feature extraction neural network is generally called autoencoder. In this network, the number of neurons in the intermediate layers is smaller than the number of neurons in the input layer. The number of neurons in the input layer and the number of neurons in the output layers are set to be equal. Moreover, a response function of each of the neurons in the input and output layers is a linear function, and other response functions of each of the neurons are sigmoid functions (1/(1+exp(-x))).

The feature extraction neural network is trained by means of a well-known art called back propagation method and weights between neurons are updated. In the embodiment of present invention, this neural network is trained to minimize mean square errors for overall input data so that data (each appearance frequency of a plurality of words obtained from text data on reputations of accommodations by performing morphological analyses) is input in the input layers and data the same as this input data is output from the output layers. Since sigmoid functions which are non-linear functions are utilized as neuron’s response functions as explained earlier, the weights between neurons are not symmetrical across the intermediate layer. As the feature extraction neural network is trained, the intermediate layer become possible to obtain the feature values indicating characteristics of each input data. Although the feature values that appear in the intermediate layer do not necessarily have clear physical implication, those feature values are considered as what were compressed to the extent that information input to the input layer can be

restored to information output from the output layer and the feature values that appear in the intermediate layer become almost similar regardless of the input feature values to the input layer. Therefore, it is not necessary to properly preselect the input feature values to the input layer any more.

In the present invention, the part from the input layer to the intermediate layers in the feature extraction neural network in which weights were trained is connected to the second neural network as the first neural network. Weights of the second neural network are trained without changing weights of the said first neural network. The training is performed by a well-known art called a back propagation method as explained earlier.

Since the trained model of the present invention is comprised of the above first and second neural networks, it can accurately analyze reputations of accommodations without presetting the feature values.

[Conclusion]

The inventions of claim 1 falls under "invention."

[Explanation]

- Claim 1

The trained model of Claim 1 is what “causes a computer to function to output quantified values of reputations of accommodations based on to text data on reputations of accommodations” as well as to what “causes the computer function to perform a calculation based on the said trained weights in the said first and second neural networks in response to appearance frequency of specific words obtained from the text data on reputations of accommodations input to the input layer of the said first neural network and to output the quantified values of reputations of accommodations from the output layer of the said second neural network.” Moreover, considering the descriptions which states that “the trained model is supposed to be utilized as a program module which constitutes a part of artificial intelligence software” and “the CPU of the computer operates, in accordance with instructions from the trained model stored in the memory, in a way that it performs a calculation based on trained weights and response functions in the first and second neural networks in response to data input to input layers of the first neural network (appearance frequency of specific words obtained from text data of reputations of accommodations, e.g. by performing morphological analyses) and outputs results from output layers of the second neural network (quantified values of reputations, e.g. “10 stars”)”, it is clear that the trained model of Claim 1 is a “program” even though the claimed subject matter of Claim 1 is described as a "model."

Moreover, it is determined, from the statement of Claim 1, that specific calculation or processing of specific information depending on the intended use which is accurate analysis of reputations of accommodations, is implemented by concrete means or procedures on which software and hardware resources cooperate, which is for a computer to “function to perform a calculation based on the said trained weights in the said first and second neural networks in

response to appearance frequency of specific words obtained from the text data on reputations of accommodations input to the input layer of the said first neural network and to output the quantified values of reputations of accommodations from the output layer of the said second neural network." For this reason, in the trained model of Claim 1, a specific information processing system depending on intended use is constructed through cooperation of software and hardware resources.

Therefore, since the information processing by software is concretely realized by using hardware resources, the trained model of Claim 1 is a creation of the technical idea utilizing a law of nature and thus falls under "invention."

[Case 2-14'] Trained Model for Analyzing Reputations of Accommodations

Title of Invention

Trained Model for Analyzing Reputations of Accommodations

What is claimed is:

[Claim 1]

A trained model for outputting quantified values of reputations of accommodations based on text data on reputations of accommodations, wherein;

the model is comprised of a parameter set consisting of trained weights of a first neural network and a trained weights of a second neural network connected in a way that the second neural network receives output from the first neural network,

the first neural network is comprised of an input layer to intermediate layers of a feature extraction neural network in which the number of neurons of at least one intermediate layer is smaller than the number of neurons of the input layer, the number of neurons of the input layer and the number of the output layer are the same, and weights were trained in a way each value input to the input layer and each corresponding value output from output layer become equal; weights of the second neural network were trained without changing the weights of the first neural network; and

the model performs a calculation based on the trained weights in the first and second neural networks in response to appearance frequency of specific words obtained from the text data on reputations of accommodations input to the input layer of the first neural network and outputs the quantified values of reputations of accommodations from the output layer of the second neural network.

Overview of the description

[Background Art]

A neural network, which has a computer function as a computing unit to calculate output in response to certain input, is capable of performing complicated information processing at high speed by being trained from a number of actual examples. Therefore, people intend to use neural networks for various purposes in such fields as image recognition, voice recognition, voice synthesis and automated translation.

Generally, in cases where neural networks are utilized in new areas, in many cases it is not clear what should be input as the input feature values for calculation by neural network, therefore, it is necessary to carefully review what should be selected as the input feature values accordingly.

In order to analyze text data on reputations of accommodations such as hotels posted on travel review sites with neural networks, it is not straightforward to select the input feature values, because the appearance frequencies of a variety of words ("Like", "! ", etc.) included in the text data can be considered as the candidate input feature values.

[Problems to be Solved by the Invention]

The present invention has been conceived in view of the above problems into consideration and aims to accurately analyze reputations of accommodations even if the input feature values are not properly pre-selected.

[Means for Solving the Problem]

The trained model of the present invention is a parameter set used in artificial intelligence software to cause a computer to function to output quantified values of reputations of accommodations based on text data on reputations of accommodations and is comprised of trained weights of a first neural network and trained weights of a second neural network connected in a way that the second neural network receives output from the first neural network.

The trained model of the present invention is utilized as a parameter set for the calculations in artificial intelligence software in a computer equipped with a CPU and a memory. Specifically, when the CPU of the computer operates, in accordance
with instructions from a program module which is a part of an artificial intelligence software, in a way that it performs a calculation based on trained weights and response functions in the first and second neural networks in response to data input to input layers of the first neural network (appearance frequency of specific words obtained from text data of reputations of accommodations, e.g. by performing morphological analyses) and outputs results from output layers of the second neural network (quantified values of reputations, e.g. “10 stars”), it is used as the trained weights utilized for the calculation in the first and second neural networks.

The first neural network is comprised of an input layer to intermediate layers of a feature extraction neural network. This feature extraction neural network is generally called autoencoder. In this network, the number of neurons in the intermediate layers is smaller than the number of neurons in the input layer. The number of neurons in the input layer and the number of neurons in the output layers are set to be equal. Moreover, a response function of each of the neurons in the input and output layers is a linear function, and other response functions of each of the neurons are sigmoid functions (1/(1+exp(-x))).

The feature extraction neural network is trained by means of a well-known art called back propagation method and weights between neurons are updated. In the embodiment of present invention, this neural network is trained to minimize mean square errors for overall input data so that data (each appearance frequency of a plurality of words obtained from text data on reputations of accommodations by performing morphological analyses) is input in the input layers and data the same as this input data is output from the output layers. Since sigmoid functions which are non-linear functions are utilized as neuron’s response functions as explained earlier, the weights between neurons are not symmetrical across the intermediate layer. As the feature extraction neural network is trained, the intermediate layer become possible to obtain the feature values indicating characteristics of each input data. Although the feature values that appear in the intermediate layer do not necessarily have clear physical implication, those feature values are considered as what were compressed to the extent that information input to the input layer can be

restored to information output from the output layer and the feature values that appear in the intermediate layer become almost similar regardless of the input feature values to the input layer.

In the present invention, the part from the input layer to the intermediate layers in the feature extraction neural network in which weights were trained is connected to the second neural network as the first neural network. Weights of the second neural network are updated by training without changing weights of the first neural network. The training is performed by a well-known art called a back propagation method as explained earlier.

Since the trained model of the present invention is comprised of the above weights of first and second neural networks, it can accurately analyze reputations of accommodations without presetting the feature values.

[Conclusion]

The invention of claim 1 does not fall under "invention."

[Explanation]

The "trained model" of claim 1 is "comprised of a parameter set consisting of trained weights of a first neural network and a trained weights of a second neural network connected in a way that the second neural network receives output from the first neural network," as stated in claim 1.

Here, the Examination Guidelines "Part III, Chapter 1" indicate that mere presentation of information (where the feature resides solely in the content of the information, and the main object is to present information), such as presentation of information (presentation per se, means for presentation or method of presentation) in which a technical feature does not reside, does not fall under "invention" (2.1.5 Those not regarded as technical ideas).

And claim 1 does not specify any presentation per se, means for presentation or method of presentation of the "trained model comprised of as a parameter set," the "trained model" of claim 1 is characterized only in the content of the information "trained weights of a first neural network and a trained weights of a second neural network connected in a way that the second neural network receives output from the first neural network," and its main object is to present information.

Therefore, the "trained model" of claim 1 is a mere presentation of information, it is generally not a creation of the technical idea utilizing a law of nature, and thus does not fall under "invention."

(Supplementary Explanation)

The "trained model" of claim 1 is "comprised of as a parameter set" as described above, so it is a set of instructions given to a computer, not a "program" that is combined to produce a specific result.

And since claim 1 merely abstractly specifies the configuration of e.g. the nodes and layers of a neural network of the premise trained model, and does not in any way specify that the parameter set prescribes computer processing, it cannot be deemed to have similar properties to programs ("equivalent to programs"). Therefore, the determination of eligibility for patent is not made according to the "idea based on the standpoint of software" (Chapter 1, 2.1.1.2 in Annex B of the Examination Handbook).

See Case 2-14 for an example of a case with the same technical content as this case, which is recognized as a "program" and falls under "invention."