Case Examples pertinent to AI-related technology

In order to enhance practical examples when Examination Guidelines for Patent and Utility Model are applied to patent applications of AI-related technology, the following 10 cases in total are added to Annex A of Examination Handbook for Patent and Utility Model from the following aspects 1 and 2.

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

   Determination on the enablement and support requirements of AI-related inventions is made in accordance with “Enablement Requirement” (Section 1, Chapter 1 of Part II) and “Support Requirement” (Section 2, Chapter 2 of Part II) in Examination Guidelines for Patent and Utility Model in the same way as that in the other technical fields.

   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. For such inventions, JPO created new Case Examples this time.

   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,
   - 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 technical 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, and Case 50).

   Inventions of product which is presumed to have a certain function because of AI cannot satisfy the description requirements without an embodiment 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 (Case 51).

List of Case Examples

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

Sugar content estimation system ............................................................... Case 46
Business plan design apparatus ............................................................... Case 47
Autonomous vehicle ............................................................................. Case 48
Body weight estimation system ............................................................... Case 49
Method for estimating allergy incidence rate of test substance ............ Case 50
Anaerobic adhesive composition ........................................................... Case 51

Note: When any ambiguity of interpretation is found in this provisional translation, the Japanese text shall prevail.
Relations among the case examples are shown in the following “Overview of Case Examples as to Description Requirement.”

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).

List of Case Examples
(Annex A, 5. Case Examples pertinent to Inventive Step)
Cancer level calculation apparatus .........................................................Case 33
Estimation system of hydroelectric generating capacity ........................Case 34
Screw clamping quality estimation apparatus .........................................Case 35
Dementia stage estimation apparatus ......................................................Case 36

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 technical knowledge in these Case Examples are only a premise for explanation of inventive step determination, and not the prior art or common general technical knowledge at the time when each of Case Examples was added to Examination Handbook for Patent and Utility Model.

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

The following 5 AI-related Case Examples have already been incorporated in Examination Handbook for Patent and Utility Model.

These 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.
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

(Annex A, 5. Inventive Step)
Learning System Comprising On-vehicle Devices and a Server ............... Case 31
Quality management program of manufacturing lines ........................ Case 32

(Annex B, Chapter 1, 3. Case)
Data Structure of Dialogue Scenarios in Voice Interactive System ........ Case 2-13
Trained Model for Analyzing Reputations of Accommodations .......... Case 2-14

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 Description Requirement

<table>
<thead>
<tr>
<th>Case Example 46</th>
</tr>
</thead>
<tbody>
<tr>
<td>It cannot be presumed that there is a correlation or the like among the multiple types of data contained in training data, even if a common general technical knowledge at the time of filing is taken into consideration.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case Examples 47 and 48</th>
</tr>
</thead>
<tbody>
<tr>
<td>Although the description does not disclose a correlation or the like among the multiple types of data contained in training data, it can be presumed that there is a correlation or the like among them in view of a common general technical knowledge at the time of filing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case Example 49: Claim 1 [broad claim]</th>
</tr>
</thead>
<tbody>
<tr>
<td>It cannot be presumed that there is a correlation or the like among the multiple types of data contained in training data, even if a common general technical knowledge at the time of filing is taken into consideration.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case Example 49: Claim 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>The statistical information disclosed in the description supports that a correlation or the like among the multiple types of data contained in training data</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case Example 50: Claim 1 [broad claim]</th>
</tr>
</thead>
<tbody>
<tr>
<td>It cannot be presumed that there is a correlation or the like among the multiple types of data contained in training data, even if a common general technical knowledge at the time of filing is taken into consideration.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case Example 50: Claim 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>The experimental evaluation of trained AI model disclosed in the description supports that a correlation or the like among the multiple types of data contained in training data</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case Example 51</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only evidence shown is inference by AI. (Suppose it is not a common technical knowledge at the time of filing that AI inference can be a substitute for experiment using actual product.)</td>
</tr>
</tbody>
</table>
Overview of Case Examples as to Inventive Step

**Case Example 1**
mere a systemization using AI of operations by human beings

**Case Example 2: Claim 1**
mere a modification of method for estimating an output data based on an input data

**Case Example 2: Claim 2**
a significant effect by adding a training data for machine learning

**Case Example 3**
modification of a training data for machine learning is mere a combination of known data, and a significant effect is not identified.

**Case Example 4**
preprocessing of a training data for machine learning

**inventive step**

**inventive step**
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
   (Annex A) ..................................................................................................................... 8
   Case 46
   Sugar content estimation system ................................................................. 9
   Case 47
   Business plan design apparatus ................................................................. 12
   Case 48
   Autonomous vehicle ................................................................................. 15
   Case 49
   Body weight estimation system ................................................................. 18
   Case 50
   Method for estimating allergy incidence rate of test substance .................. 22
   Case 51
   Anaerobic adhesive composition ............................................................... 26

2. Cases pertinent to Inventive Step
   (Annex A) ........................................................................................................... 29
   Case 33
   Cancer level calculation apparatus ............................................................ 30
   Case 34
   Estimation system of hydroelectric generating capacity ........................... 33
   Case 35
   Screw clamping quality estimation apparatus ........................................... 37
   Case 36
   Dementia stage estimation apparatus ....................................................... 41

(Annex A, 3. Eligibility for Patent and Industrial Applicability)
   Case 3-2
   Sugar Content Data of Apples and a Method for Predicting Sugar Content Data of Apples ........................................................................................................ 46

(Annex A, 5. Inventive Step)
   Case 31
   Learning System Comprising On-vehicle Devices and a Server ........................... 52

   Case 32
   Quality management program of manufacturing lines ......................................... 59

(Annex B, Chapter 1, 3. Case)
   Case 2-13
   Data Structure of Dialogue Scenarios in Voice Interactive System .................... 64

   Case 2-14
   Trained Model for Analyzing Reputations of Accommodations ....................... 69
1. Cases pertinent to the Description Requirements for the Description and Claims
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 a 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.

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.
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.
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 model and obtains a quick reaction capability score representing a quick reaction capability of the driver during vehicle operation from the trained learning model, the trained learning model having been trained through machine learning 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, 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 a learning 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.
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.
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 0% or more of the candidate substances, the difference between the estimated score and the actual score was equal to or less than 0%.

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.

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.
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.
2. Cases pertinent to Inventive Step
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.
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.
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 upstream 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 upstream 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 upstream 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 upstream 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 upstream 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.
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 screwdriver, discloses that there is a correlation between a position and inclination of a screwdriver and it affects the assessment. Both Cited Invention 1 and Cited Invention 2 assess a screw clamping quality based on several conditions of a screwdriver, 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.
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.
The invention of Claim 1 and Cited Invention 1 are different from each other at the point below.

(A) 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.
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 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 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 1] Does not fall under "invention."
[Claim 2] Does not fall under "invention."
[Claim 3] Falls under "invention."
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 data 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 Claim 1 and 2 cannot overcome the reason for refusal.
[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;

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.
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 \( \gamma \) by the said weights at the time of learning. A forgetting coefficient \( \gamma \) 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 $\gamma$ is set by a bivariable function of $\gamma=f(k, t_1)$, wherein $k$ quantitatively indicates the degree of change in characteristics of manufacturing devices across the ages and $t_1$ indicates the time elapsed from the previous maintenance. The said degree of change $k$ is set by a bivariable function of $k=g(\alpha, t_2)$, wherein $\alpha$ indicates a type of manufacturing devices and $t_2$ 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 $\gamma$ 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 $f(k, t_1)$ and $g(\alpha, t_2)$ 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 database 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 $\gamma$ is multiplied by the weights of the neural network at the time of learning, the said forgetting coefficient $\gamma$ is set by a bivariable function of $\gamma=f(k, t_1)$, wherein $k$ quantitatively indicates the degree of change in characteristics of manufacturing devices across the ages and $t_1$ indicates the time elapsed from the previous maintenance, and the said degree of change $k$ is set by a bivariable function of $k=g(\alpha, t_2)$, wherein $\alpha$ indicates a type of manufacturing devices and $t_2$ 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 $\gamma$ 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.
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.
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”.
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.")
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”.