Chapter 4
Inventive Step

The concept of Inventive Step itself is the same in every technical field.
However, there are some unique aspects for software-related inventions that we should learn carefully.

If you find it difficult, focus on the speech bubbles, because it's more important to understand the overall flow than the details.

* The speech bubbles are designed with beginners in mind, emphasizing ease of understanding over accuracy.

How to read this Manga

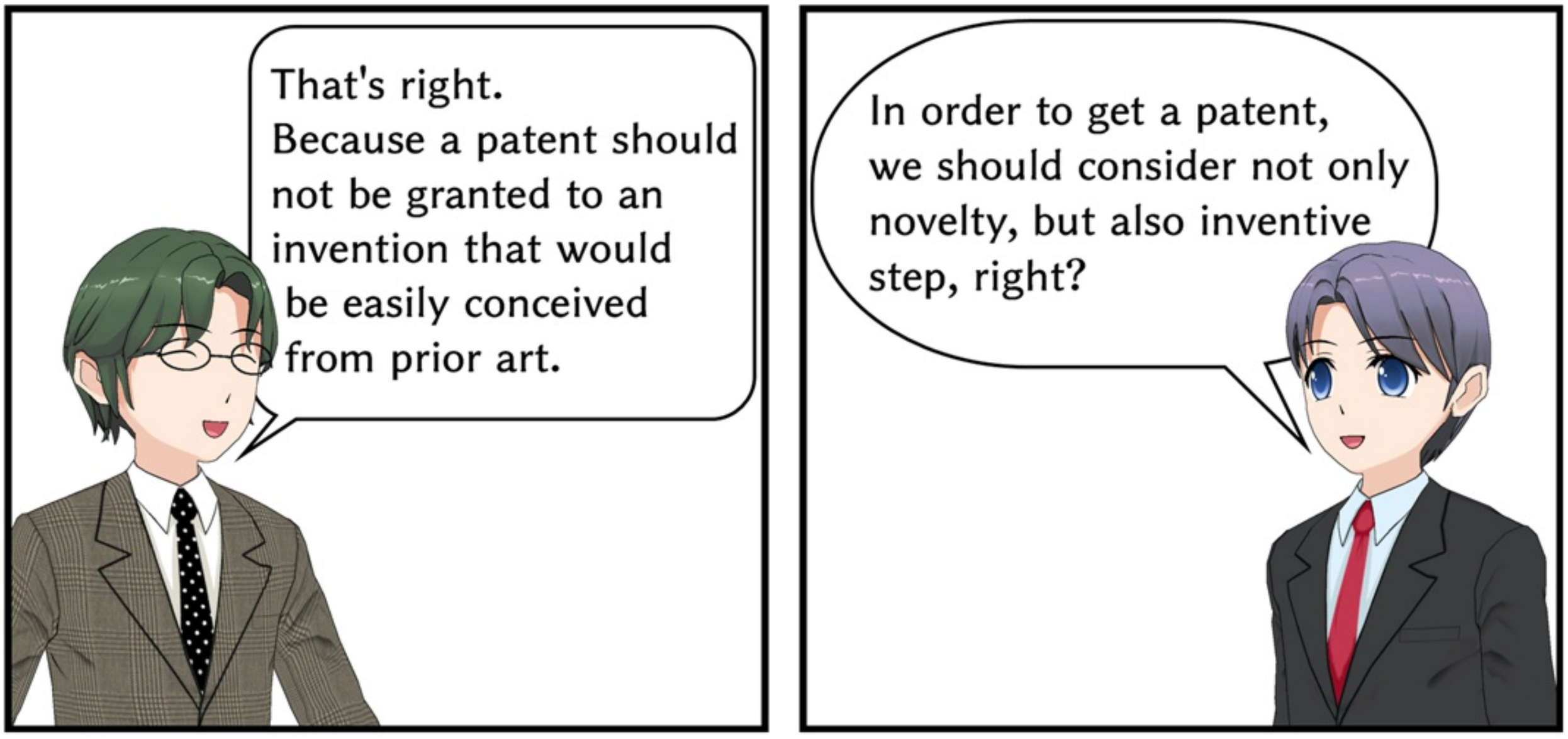
1
Hey,
look at this, Ota !

2
What seems to be
the problem?
Please calm down
a little bit as
e president

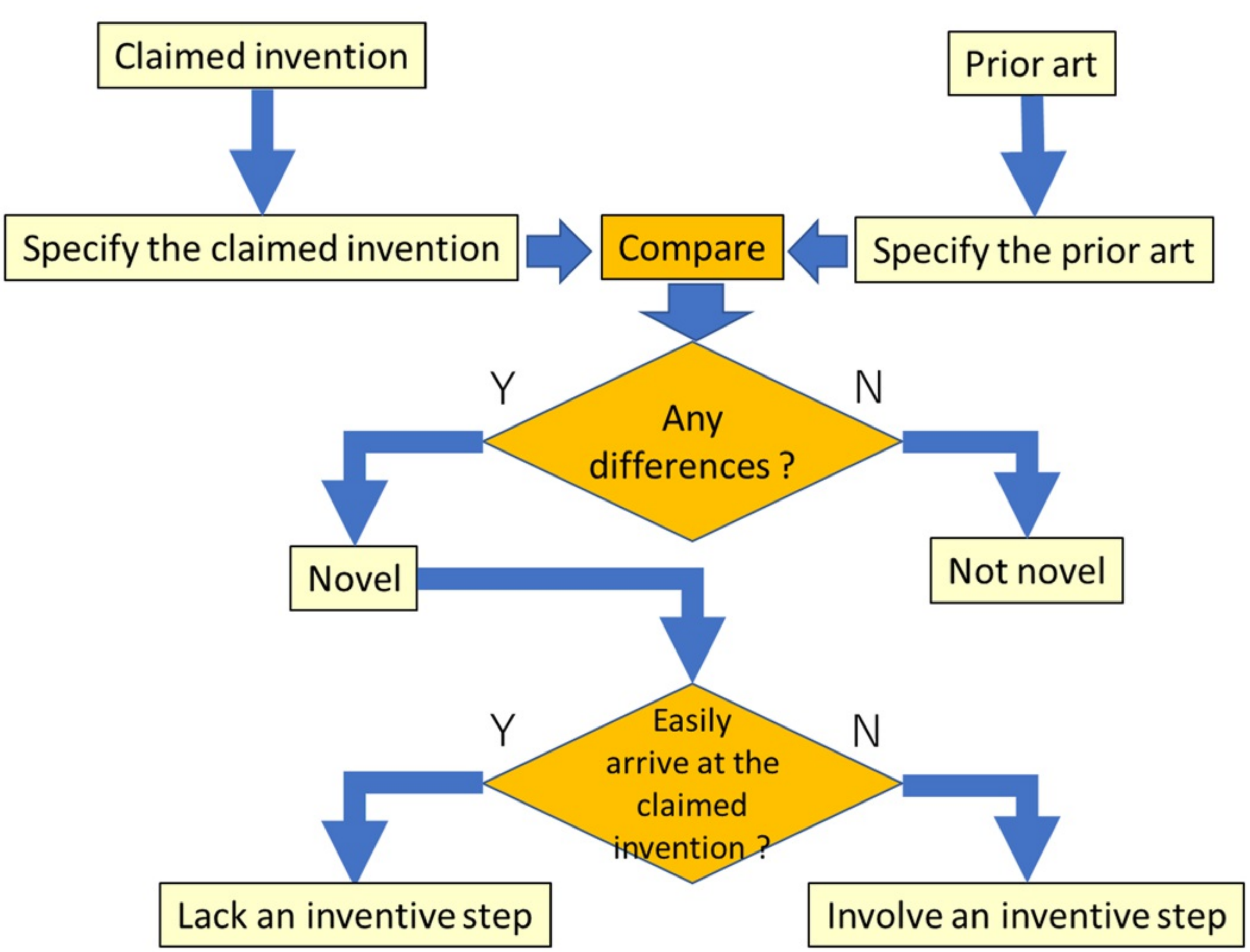
3
This article says that the
technology some companies
worked so hard to develop
can sometimes be easily
copied by oth panies!

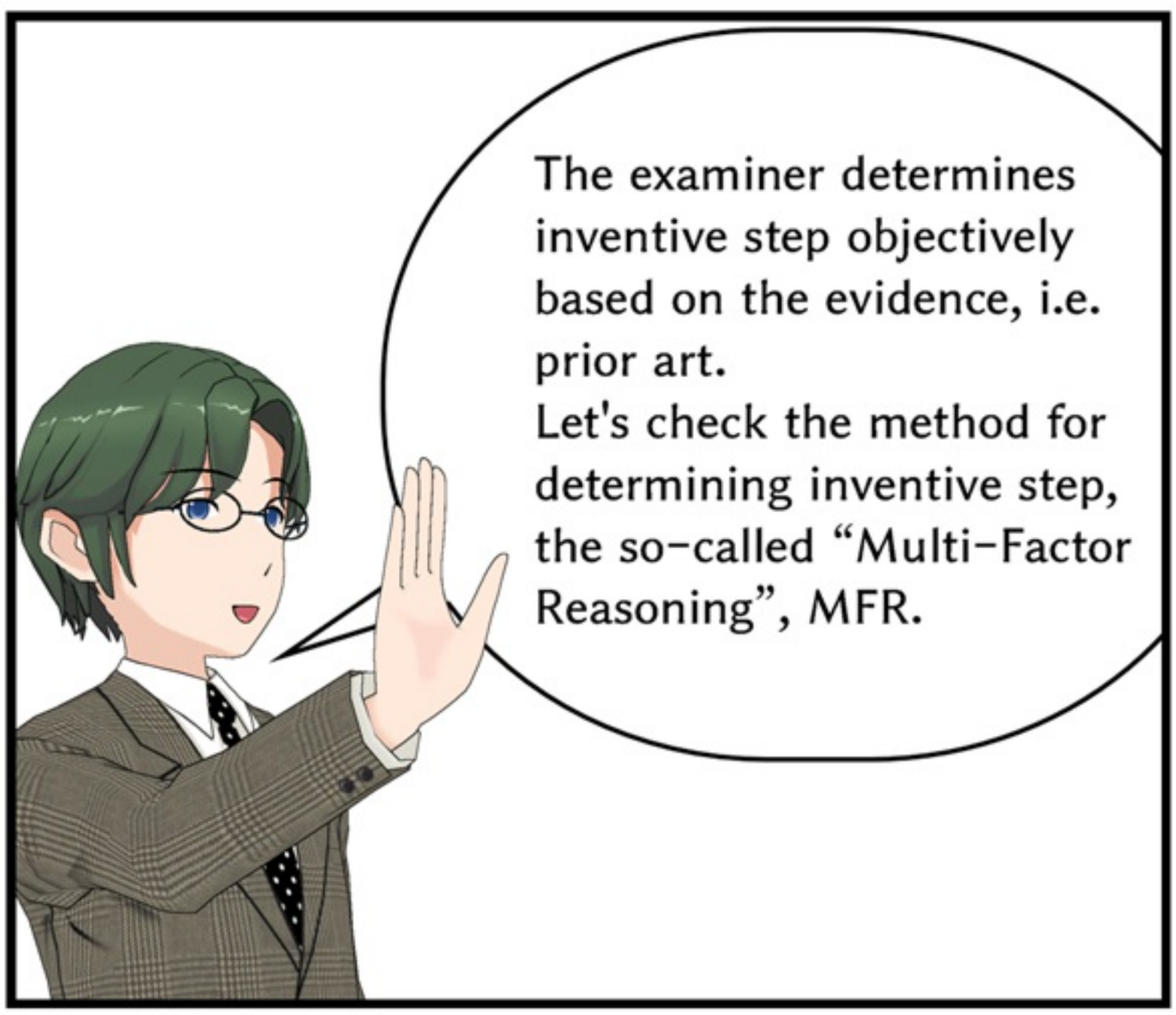
4
Examples of how technology leaked
• Fake products are mad
• Spies steal informati n
(industrial espionage).
Collaborators betray their partners.
nployees take out confidential
mation of their offices.
are misconfigured.

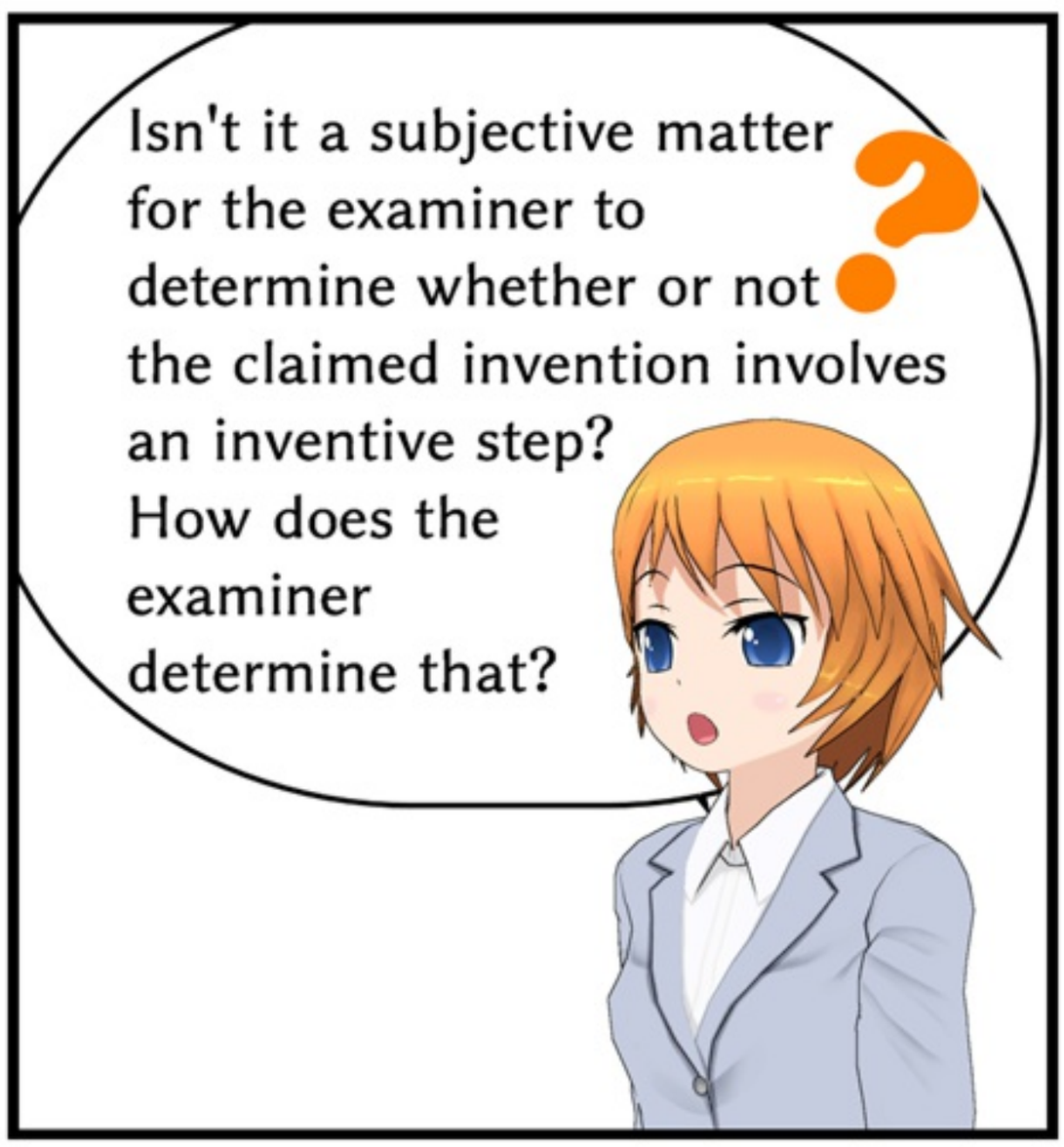
5
Well, it's not only other
com anies, you know.
That could happen to us
because we also develop
AI software.



Flowchart for determining novelty and inventive step







Method for determining inventive step, the so-called “Multi-Factor Reasoning”

Multi-Factor Reasoning

Determining whether it is possible to reason that a person skilled in the art would easily arrive at the claimed invention from the primary prior art.

A person skilled in the art
→ a hypothetical person who has the common general knowledge in the technical field of the claimed invention.

A person skilled in the art
(a hypothetical person)

Oh, I didn't know this kind of technology existed.
Let's apply it to the primary prior art.

The claimed invention lacks an inventive step if it can be reasoned that a person skilled in the art would easily arrive at the claimed invention even though the person skilled in the art doesn't know about the claimed invention.

Well, Ai, even in disguise, it's obvious that it's you.

In many cases, primary prior art is chosen to be similar to the claimed invention.

Primary prior art is the start point to determine if the claimed invention involves an inventive step.
It'll be chosen from among inventions cited as prior art.

"Primary prior art" is an unfamiliar term to me.

All claimed inventions are subject to be determined an inventive step.
So, a single patent application can contain multiple goal points.

OK, then the claimed invention is the goal point, right?
What happens if there are more than two claims in a patent application?
Which claim is the goal point?

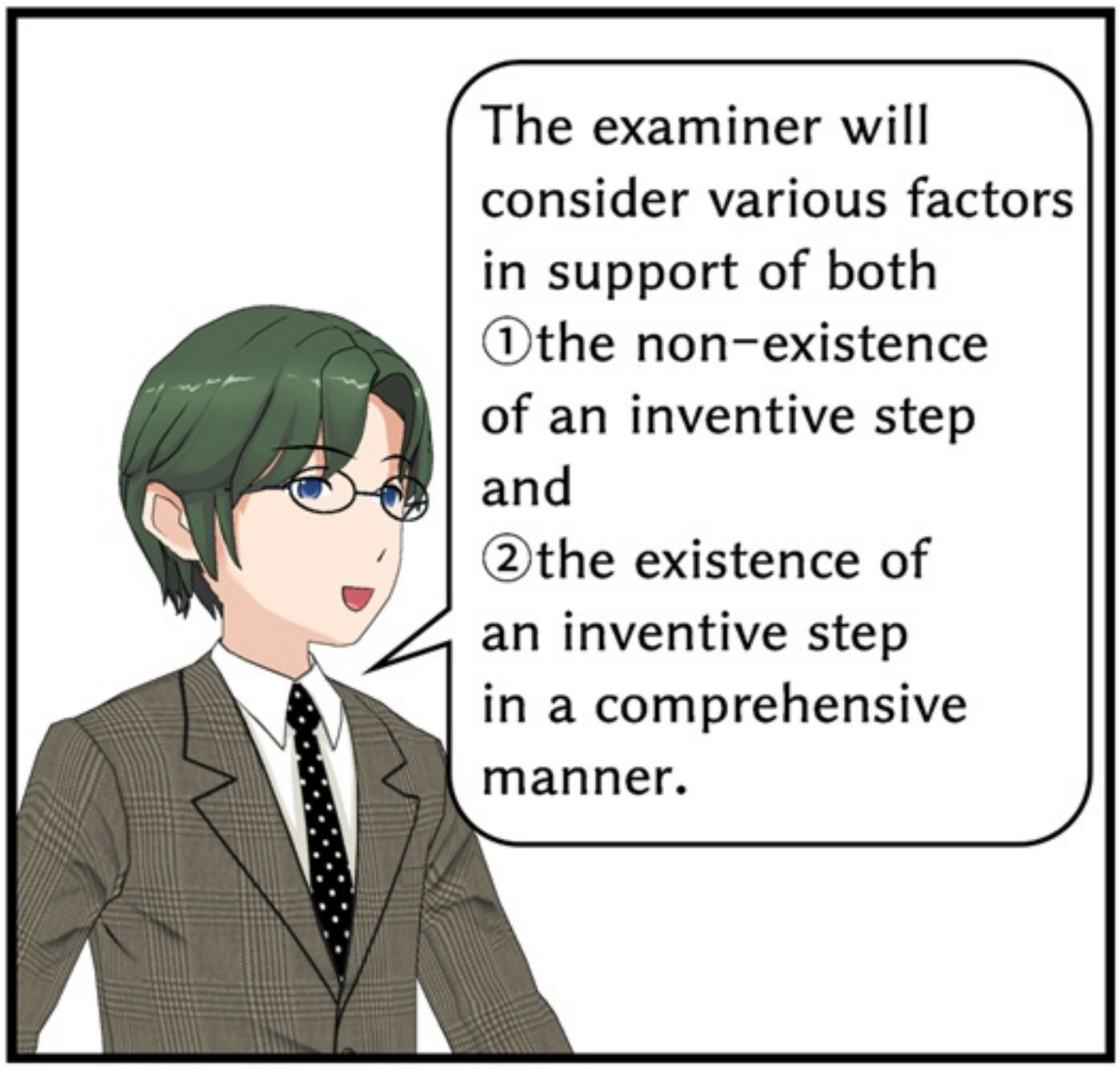
START Comparison GOAL

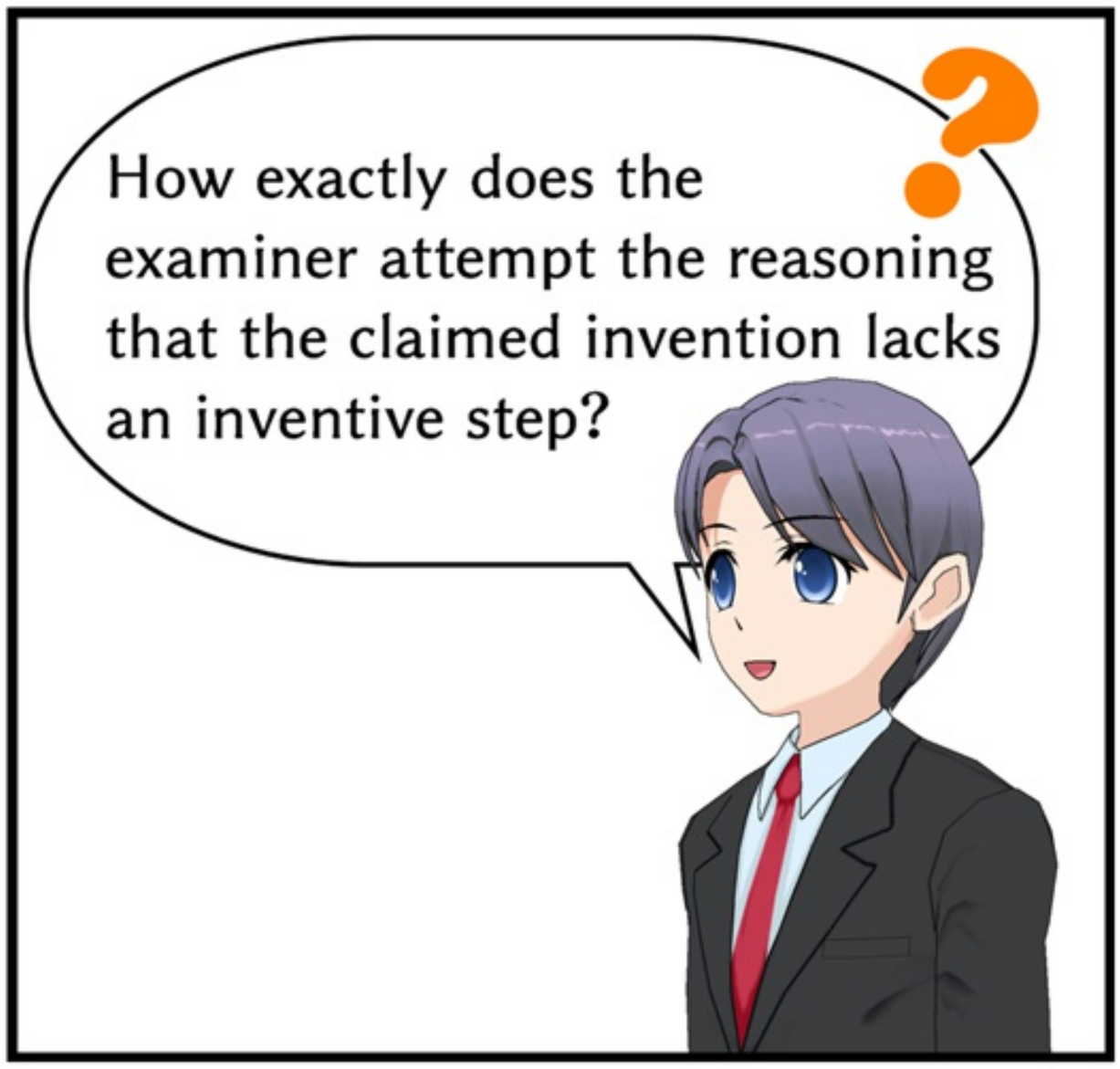
Primary prior art ⟷ Claimed invention

The identical features between them are included in the start point.

The differences between the claimed invention and the primary prior art are the midway points.

How will the midway points from the start point to the goal point be determined?





Flowchart for determining inventive step

① Considering various factors in support of the non-existence of an inventive step

Reasoning (※) is possible?

N → Involve an inventive step

Y

※Reasoning that a person skilled in the art would easily arrive at the claimed invention.

② Considering various factors in support of the existence of an inventive step

Reasoning (※) is possible?

Y → Lack an inventive step

N → involve an inventive step

Motivation for applying secondary prior art to primary prior art

Typical case

If the secondary prior art (B) is applied to the primary prior art (A) and then the resultant (A+B) is equivalent to the claimed invention.

Primary prior art
A

Claimed invention
A + B

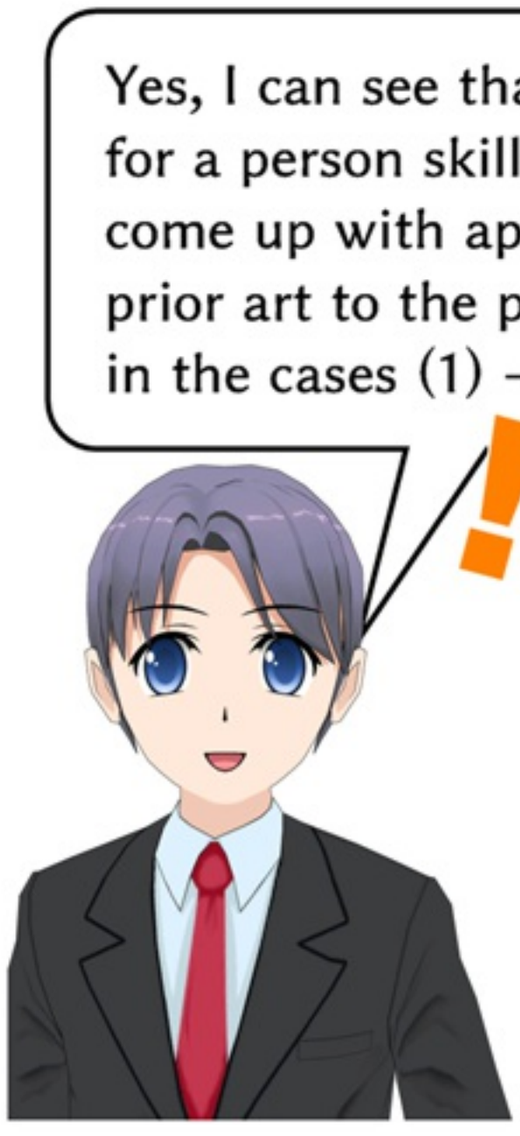
Is there a motivation for applying secondary prior art to primary prior art?

There are also cases where several conventional technologies (secondary prior art) are applied to the primary prior art.

The typical reasoning that the claimed invention lacks an inventive step is that there is a motivation for applying secondary prior art to primary prior art.

If the secondary prior art has a certain relationship with the primary prior art, there will be the cases where it is easy to apply such secondary prior art to the primary prior art without knowing the claimed invention.

I understand that we assume that a person skilled in the art doesn't know about the claimed invention, but why would such a person have a motivation to conveniently apply B to A ?



Yes, I can see that it would be easy for a person skilled in the art to come up with applying secondary prior art to the primary prior art in the cases (1) – (4).

Motivation for applying secondary prior art to primary prior art

Comprehensively consider the following points of views, noting that it is not always possible to determine by paying attention to only one of them:

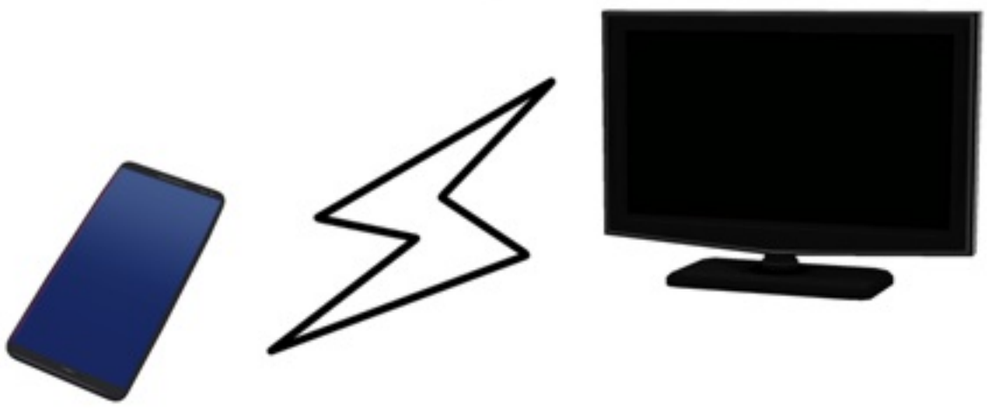
(1) Relation of technical fields
(2) Similarity of problems to be solved
(3) Similarity of operations or functions
(4) Suggestions shown in the content of prior art

Design variation

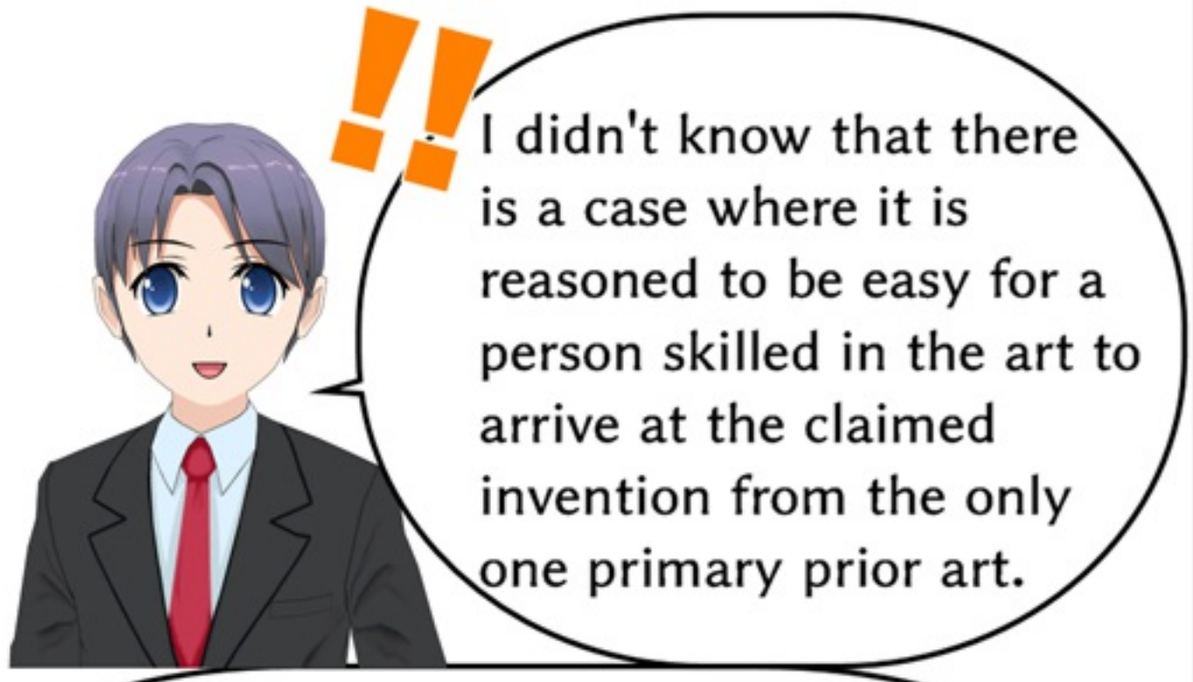
If a person skilled in the art would arrive at the claimed elements that correspond to the differences between the claimed invention and the primary prior art by the following items (i) to (iv) starting from the primary prior art, there is a factor in support of the non-existence of an inventive step.

(i) Selection of optimum materials from publicly known materials to solve certain problems
(ii) Optimally or preferably modified numerical ranges to solve certain problems
(iii) Materials replaced by equivalents to solve certain problems
(iv) Design variation or design choice associated with an application of specific techniques to solve certain problems

Example of design variation



In connecting an output terminal of a mobile phone to a digital television set as an external display device and displaying an image on the digital television set, generating and outputting an image signal adapted to a display size and image resolution of the digital television set.



Mere aggregation of prior art

Example of mere aggregation of prior art

A gondola apparatus for working at an outward walls of a building comprising a well-known lift means A.
＋ a well-known windbreak cover member.
＋ a well-known tool storage means.

① Factors in support of the non-existence of an inventive step (summary)

Motivation for applying secondary prior art to primary prior art	Comprehensively consider the following points of views: (1) relation of technical fields (2) similarity of problems to be solved (3) similarity of operations or functions (4) suggestions shown in the content of prior art
Design variation	(i) Selection of optimum materials from publicly known material (ii) Optimally or preferably modified numerical ranges (iii) Materials replaced by equivalents (iv) Design variation or design choice associated with an application of specific techniques
Mere aggregation of prior art	Functions or operations of claimed elements are not related to each other

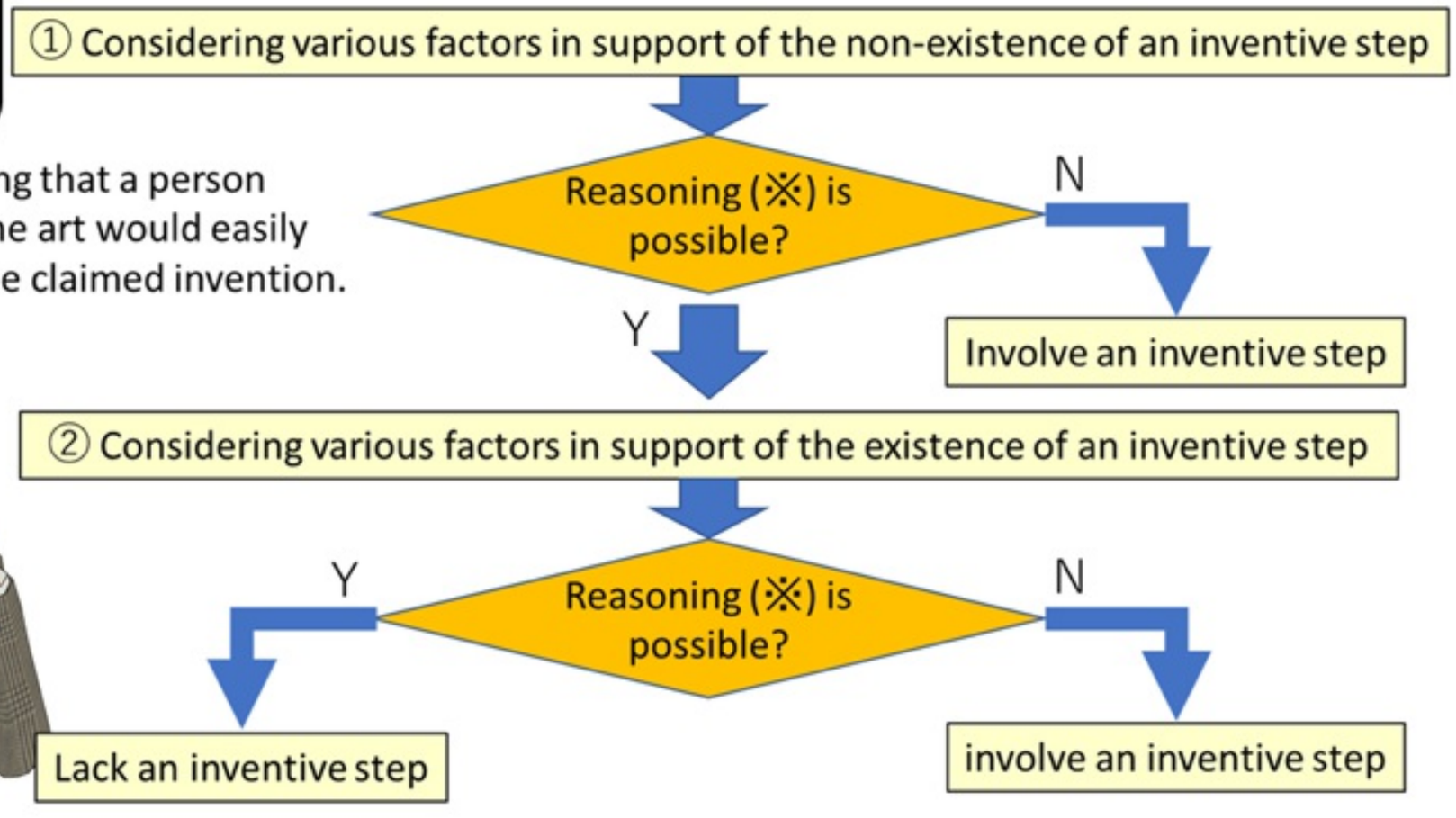
So, it'll be considered to involve an inventive step if the reasoning is not possible at the phase ①.

And if the reasoning is possible at the phase ①, then it'll go to the phase ② to see if there are the factors in support of the existence of an inventive step.

Next, let's learn the factors in support of the existence of an inventive step!

※Reasoning that a person skilled in the art would easily arrive at the claimed invention.

Flowchart for determining inventive step



Advantageous effects

If there are advantageous effects compared to prior art, that will be a factor in support of the existence of Inventive Step, right?

Will it always support an inventive step if there is some kind of effect compared to prior art?

On the other hand, if the claimed invention exceeds what is predictable based on the state of the art, it is a strong factor in support of the existence of inventive step.

Even with the advantageous effects, the claimed invention lacks an inventive step if it can be sufficiently reasoned that a person skilled in the art would arrive at the claimed invention.

Examples of advantageous effects exceeding what is predictable based on the state of the art

(i) The claimed invention has an effect of the different nature from that of the prior art and a person skilled in the art is not able to expect the effect of the claimed invention on the basis of the state of the art at the time of filing.

(ii) The claimed invention has an effect of the same nature but significantly superior to that of the prior art and a person skilled in the art is not able to expect the effect of the claimed invention on the basis of the state of the art at the time of filing.

※ Particularly in technical fields where it is difficult to expect the effect based on the structures of the products such as chemical field, the advantageous effects are an important factor for determining the existence of an inventive step.

Obstructive factors

When there are obstructive factors as in this case, it will be a factor in support of an inventive step.

However, even if the obstructive factors are taken into account, the claimed invention lacks an inventive step if it is sufficiently reasoned that a person skilled in the art would easily arrive at the claimed invention.

Suppose the primary prior art's goal is to avoid the use of expensive apparatuses, and the secondary prior art assumes the use of expensive apparatuses. Would a person skilled in the art try to apply the secondary prior art to the primary prior art?

I see.
So, even if there are advantageous effects or obstructive factors, it doesn't mean that an inventive step is unconditionally involved, but rather, various factors are fully taken into consideration.

In what other cases can we say that there are obstructive factors?

Examples of obstructive factors

(i) The secondary prior art applied to the primary prior art cannot achieve the purpose of the primary prior art.

(ii) The secondary prior art applied to the primary prior art cannot adequately function.

(iii) The secondary prior art which is considered to be excluded from application and unable to be adopted by the primary prior art.

(iv) The secondary prior art which a person skilled in the art would not apply due to a publication disclosing that the secondary prior art is inferior to the other embodiment in respect of operations and effects of the prior art.

Flowchart for determining inventive step (summary)

① Considering various factors in support of the non-existence of an inventive step

※Reasoning that a person skilled in the art would easily arrive at the claimed invention

- Motivation for applying secondary prior arts to primary prior art
- Design variation
- Mere aggregation of prior art

Reasoning (※) is possible?

N → Involve an inventive step

Y

② Considering various factors in support of the existence of an inventive step

- Advantageous effects
- Obstructive factors

Reasoning (※) is possible?

Y → Lack an inventive step

N → Involve an inventive step

So the examiner considers ① and ② comprehensively and comes to a conclusion.

As for the basic concept, yes, but, there are some unique aspects for AI and IoT technologies that we need to be aware of, so let's take a look at them.

Is the concept of inventive step the same for all technical fields?

Team of Experts
(a person skilled in the art)

Computer expert

Rice cooker expert

Let's consider "a person skilled in the art" as “a team of experts” in computer technology and other specific technologies.

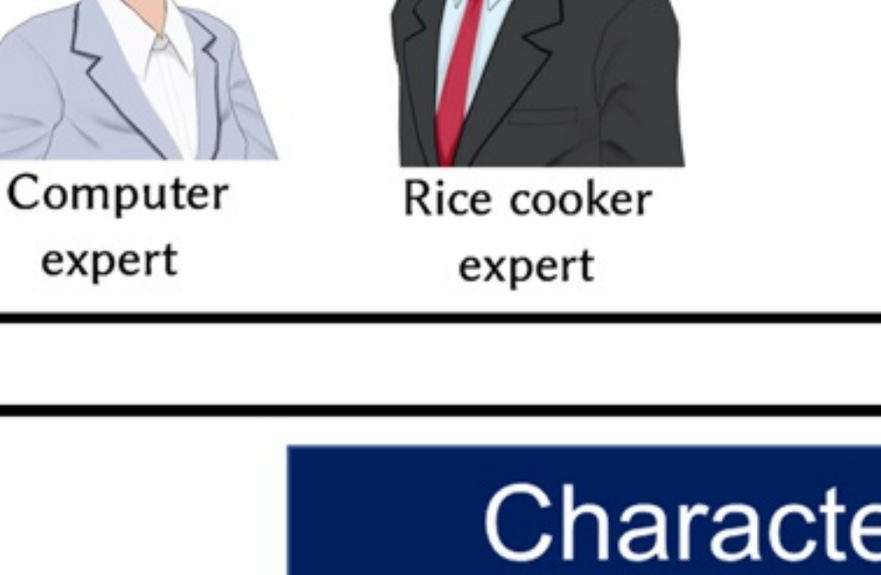
Software-related inventions, including AI and IoT, are characterized by the tendency to integrate computer technology with other specific technologies.

Characteristics of computer software-related inventions Part 1

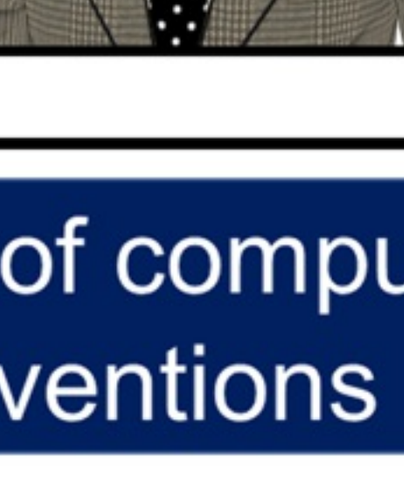
Ordinary creativity
of a person skilled in the art

Combination of technologies utilized in various specific fields or application thereof to other specific fields falls within normal creation activity of a person skilled in the art!

I'll apply the primary prior art to my rice cooker!



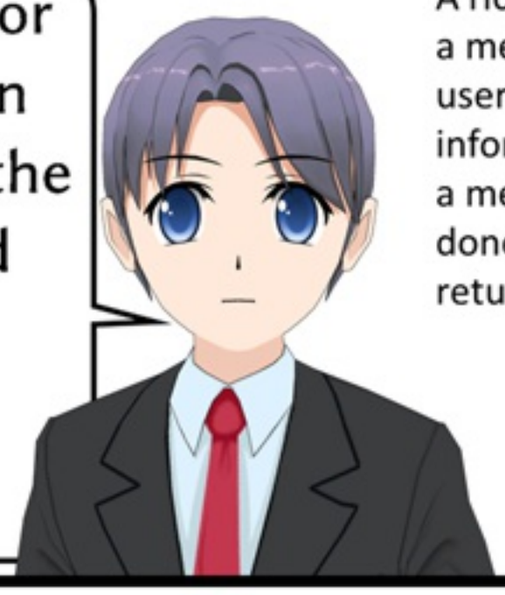
<Primary prior art>
A water heater system comprising:
a means for making estimations for the time of the user's return home based on the user’s schedule information; and
a means for starting supplying hot water to the bathtub so that the bathtub is filled right before the estimated time of the users' return home.



<Well-known art>
A rice cooker system to set the time to start cooking rice so that cooking is done at a desired time.

<Claimed invention> (Examination Handbook Annex B, Chapter 1, 2.2.3.3 Example 3)
A rice cooker system comprising:
a means for making estimations for the time of the user's return home based on the user’s schedule information; and
a means for starting cooking rice so that cooking is done right before the estimated time of the users' return home.

I don't see any advantageous effects or obstructive factors and it seems it can be reasoned that a person skilled in the art would easily arrive at the claimed invention by applying the primary prior art to the well-known rice cooking technology.



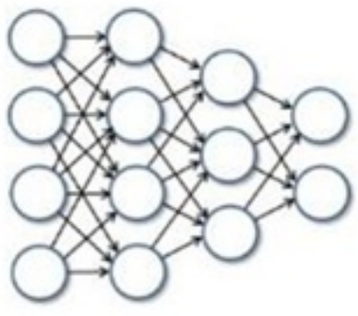
Lack an inventive step

Characteristics of computer software-related inventions Part 2

Issues involved in software or computerization

Issues involved in software or computerization are often general issues common to the computer technology field.

<Primary prior art>
A method for predicting the welding characteristics of a steel plate using a mathematical model.



<Secondary prior art>
A method for predicting the quality of glass using a neural network model.

<Claimed invention>
(Examination Handbook Annex B, Chapter 1, 2.2.3.3 Example 1)
A method for predicting the welding characteristics of a steel plate using a neural network model.

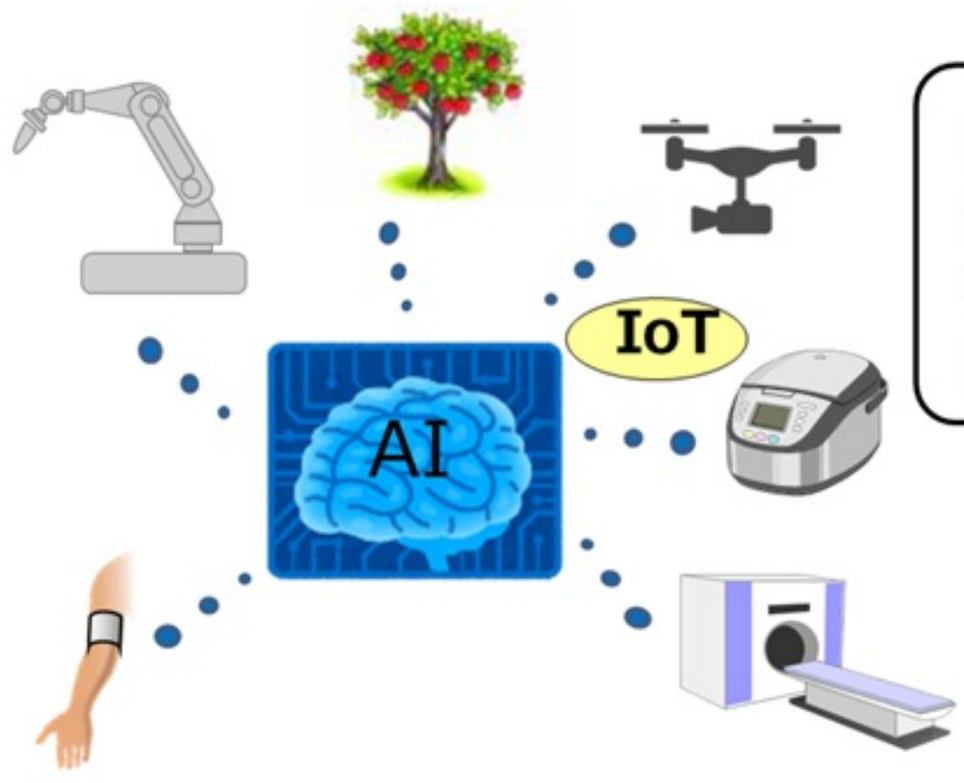
Lack an inventive step

Using neural network models to improve prediction accuracy is often a general problem in the field of computer technology.
So, in this case, even though the primary prior art doesn't explicitly state such a problem, we can say that the primary prior art and the secondary prior art share the same problem to be solved.

Characteristics of computer software-related inventions Part 3

General effects that can be obtained by systemization of a computer

General effects that can be obtained by systemization of a computer, such as "capable of processing fast," "capable of processing volume of data," "capable of reducing errors," "obtaining uniform results," or the like, are often effects naturally involved in systemization. Normally, it cannot be stated that these general effects are unpredictable from the state of the art at the time of filing.

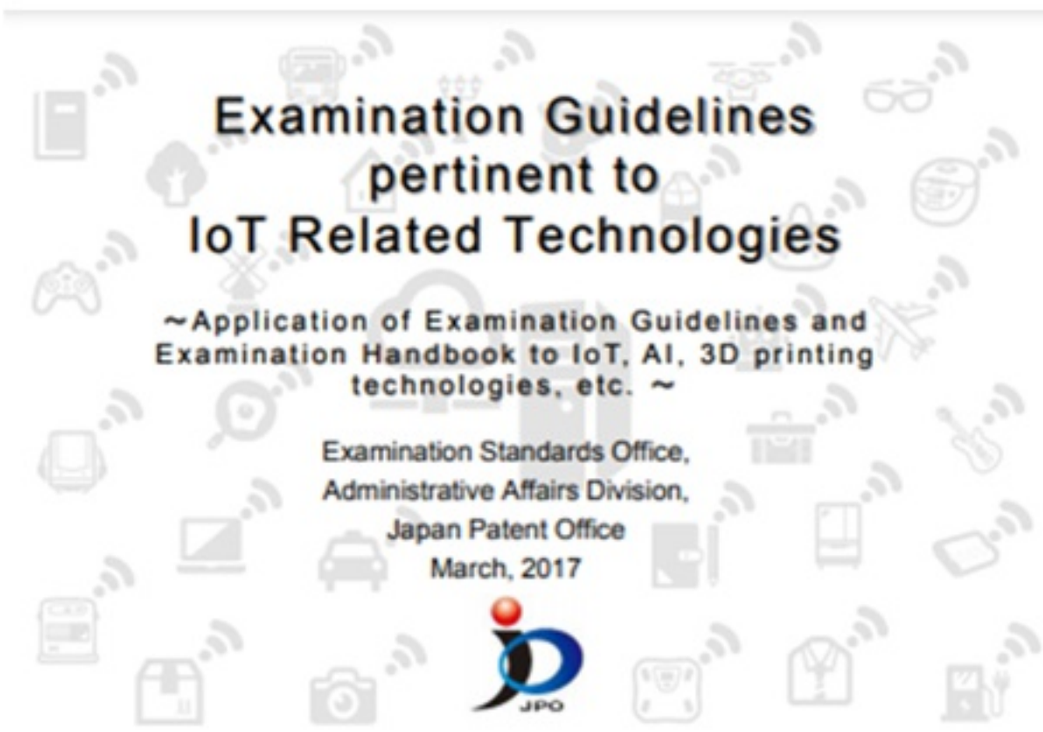


Only unpredictable effects can be considered as factors in support of the existence of an inventive step!

Aren't they in AI and IoT Case Examples?
Make sure you read them, OK?

Hey Ai,
what about you?

It would be easier for us to understand how an inventive step is determined with specific case examples.



https://www.jpo.go.jp/e/system/laws/rule/guideline/patent/iot_shinsa.html

https://www.jpo.go.jp/e/system/laws/rule/guideline/patent/ai_jirei_e.html

There are many case examples on inventive step, so I've selected 4 cases for you to take a look.

Let's compare the claimed invention with the primary prior art and specify the identical features and the differences.

We'll start with a standard case of applying the secondary prior art to the primary prior art.

Screw clamping quality estimation apparatus

[Claim 1] (Examination Handbook Annex A, 5. Inventive step, Case 35)

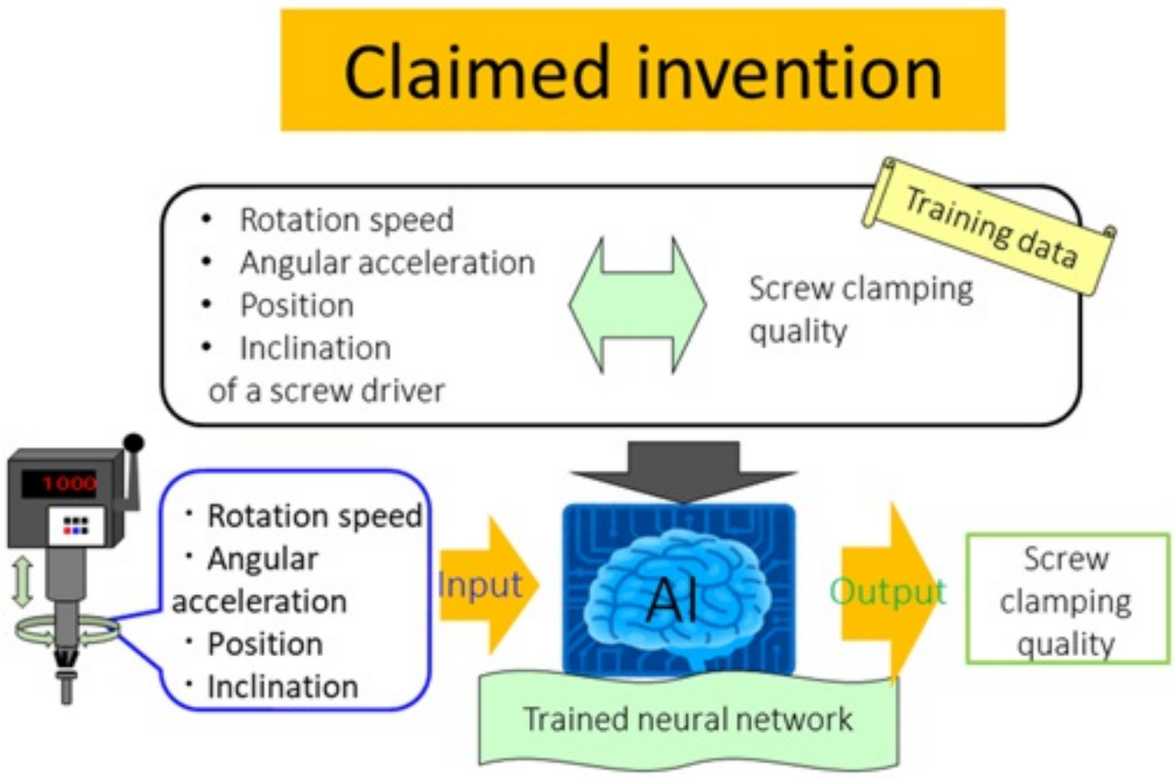
A screw clamping quality estimation apparatus that assesses a screw clamping quality at the time of automatic screw clamping operation by means of a screwdriver comprising:

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

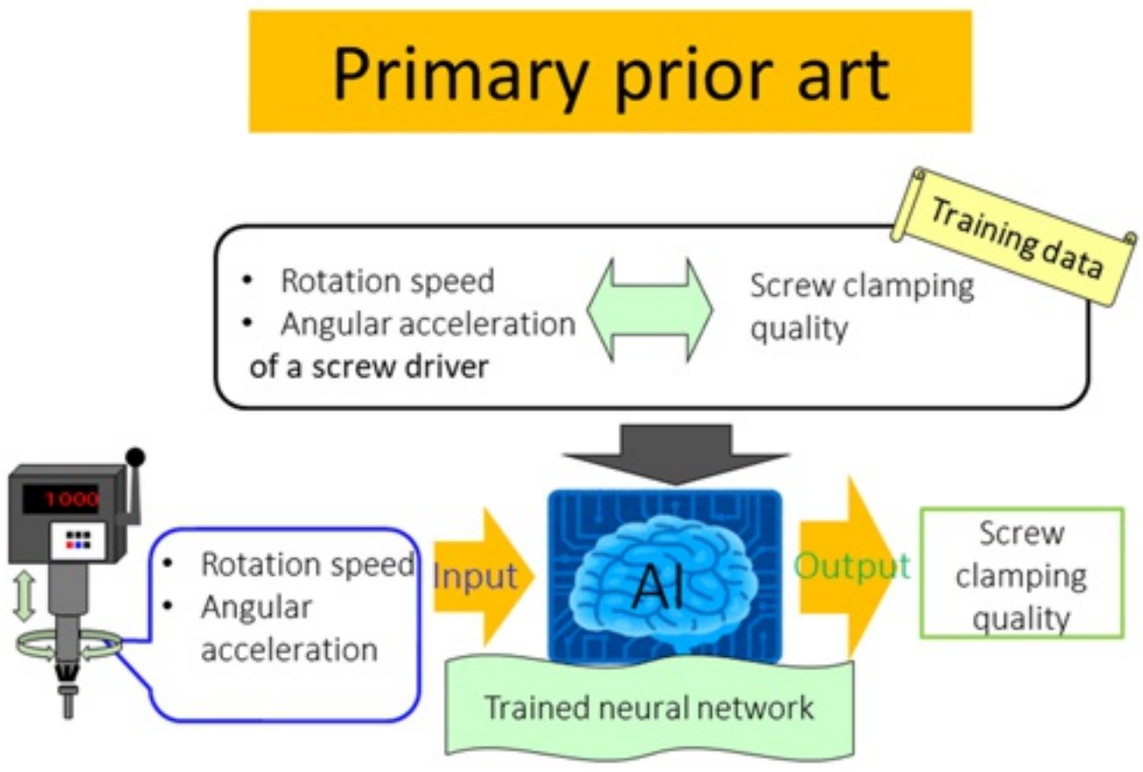
a machine learning unit that trains a neural network through machine learning by associating, with each other, the set of condition variables measured by the condition measurement unit and the screw clamping quality at the time of automatic screw clamping operation with the use of the set of condition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

Claimed invention



Primary prior art



And the difference is that in addition to rotation speed and angular acceleration, position and inclination of a screw driver are also used as parameters for estimation, right?

!!

I think the identical feature is to use AI to estimate screw cramping quality.

Key points

Is there a motivation to apply the secondary prior art to the primary prior art ? If so, why?

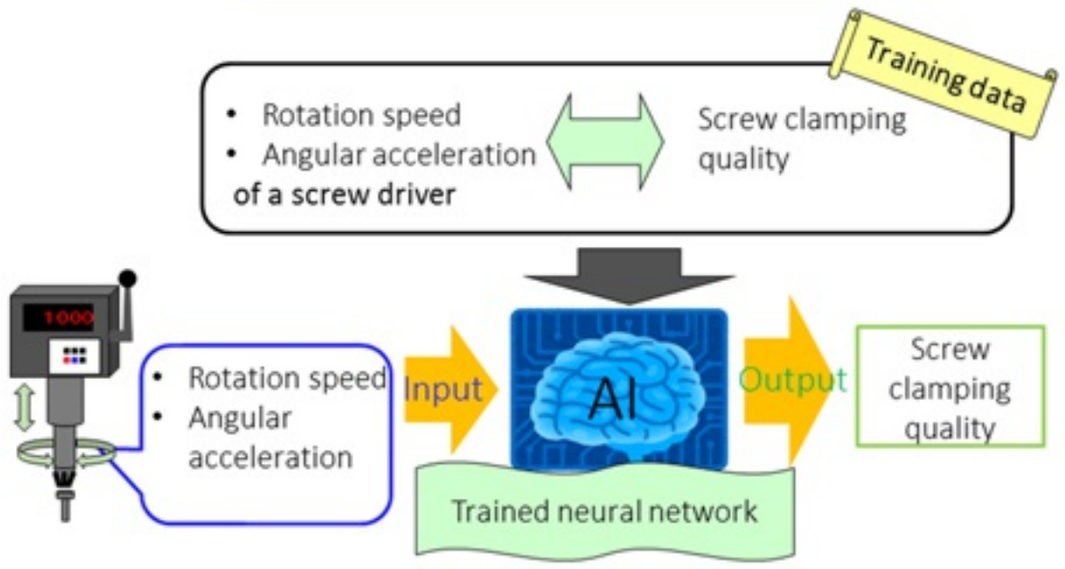
Let's put aside the claimed invention for a moment and think about the above.

Can we say that a person skilled in the art would easily arrive at the claimed invention based on the primary prior art and the secondary prior art?

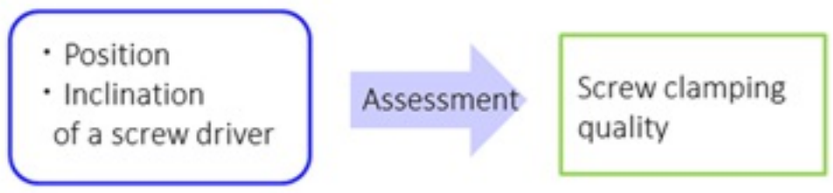
Suppose that there is a secondary prior art that uses the position and the inclination of a screw driver to estimate the quality of screw clamping.

Screw clamping quality estimation apparatus (cont.)

Primary prior art



Secondary prior art



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

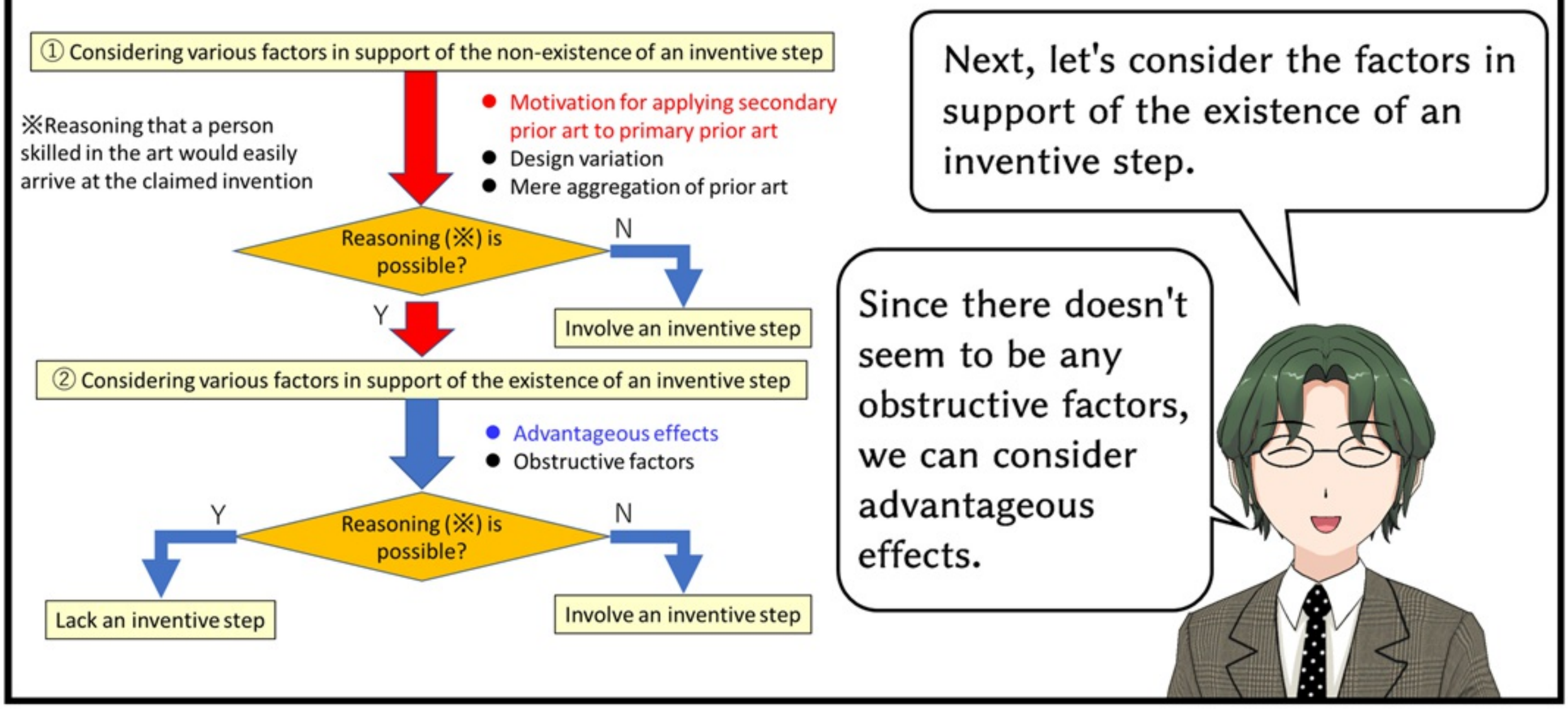
- ✓ Both the primary prior art and the secondary prior art assess a screw clamping quality based on several conditions of a screw driver.
  → They are common with each other in the technical field and the problem to be solved.
- ✓ It is a common general technical knowledge in the technical field of machine 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.

Well, according to the secondary prior art, the position and inclination of the screwdriver also have something to do with the quality of the screw clamping.
I wonder what happens if I add position and inclination to the input variables in the primary prior art.

There is a motivation for applying the secondary prior art to the primary prior art.

I see. Since we assume a team consisting of experts in screw clamping quality and experts in machine learning as a person skilled in the art, using a common general knowledge in the field of machine learning is within the scope of an exercise of ordinary creativity of a person skilled in the art.

A person skilled in the art



Screw clamping quality estimation apparatus (conclusion)

Primary prior art

Rotation speed
Angular acceleration

×

Secondary prior art

Position
Inclination

→ Enhancing an accuracy of the output

Answer: Lack an inventive step

The key point is whether advantageous effects compared to prior art exceed what is predictable based on the state of the art.
Let's also remember that the general effects of systemization, etc., are deemed easily predictable for a person skilled in the art.

Compare the claimed invention with the primary prior art and specify the identical features and the differences.

Let's take a look at an another case of applying the secondary prior art to the primary prior art.

Heavy rain point specifying system

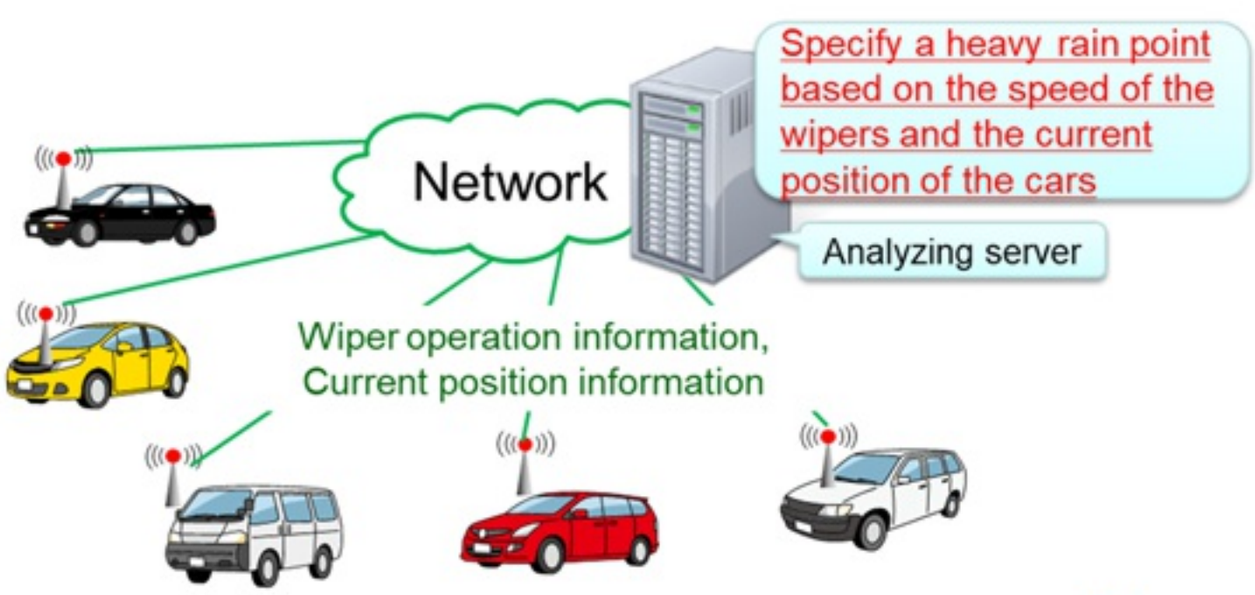
[**Claim 1**] (Examination Handbook Annex A, 5. Inventive step, Case 28)

A heavy rain point specifying system comprising windshield wiper operation sensors attached to windshield wipers which a plurality of vehicles equip, and an analyzing server connected to the windshield wiper operation sensors through a network,

wherein the windshield wiper operation sensor comprises: a detecting unit for detecting operation information including acceleration information of the windshield wiper; an acquiring unit for acquiring current position information on the sensor; and a transmitting unit for transmitting the current position information made to correspond to the operation information to the analyzing server,

the analyzing server comprises: a collecting unit for collecting the operation information and the current position information from the plurality of windshield wiper operation sensors; and an analyzing unit for statistically analyzing the current position information made to correspond to the operation information, exhibiting that the windshield wiper is operated at a high speed, of a plurality of collected operation information, thereby specifying a point at which heavy rain occurs.

Claimed invention



Primary prior art

And the difference is that the claimed invention specifies a heavy rain point, while the primary prior art detects the failure of the wiper.
The purpose of the analysis is totally different.

The identical feature is to collect wiper operation information, etc. to the analyzing server for analysis, right?

Key points

Is there a motivation to apply the secondary prior art to the primary prior art ? If so, why?

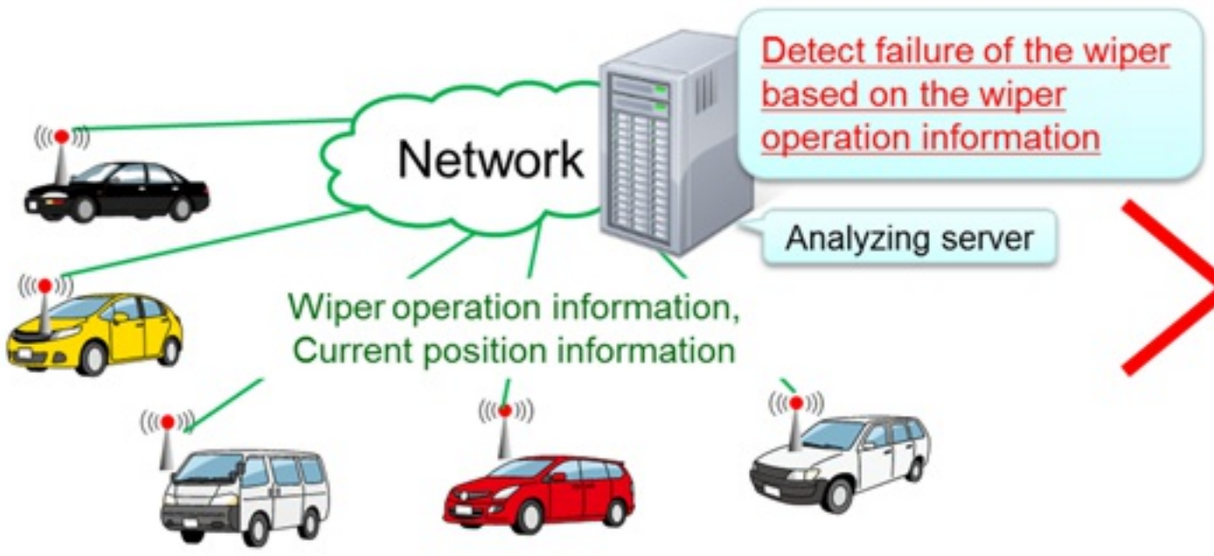
Let's put aside the claimed invention for a moment and think about the above.

Can we say that a person skilled in the art would easily arrive at the claimed invention based on the primary prior art and the secondary prior art?

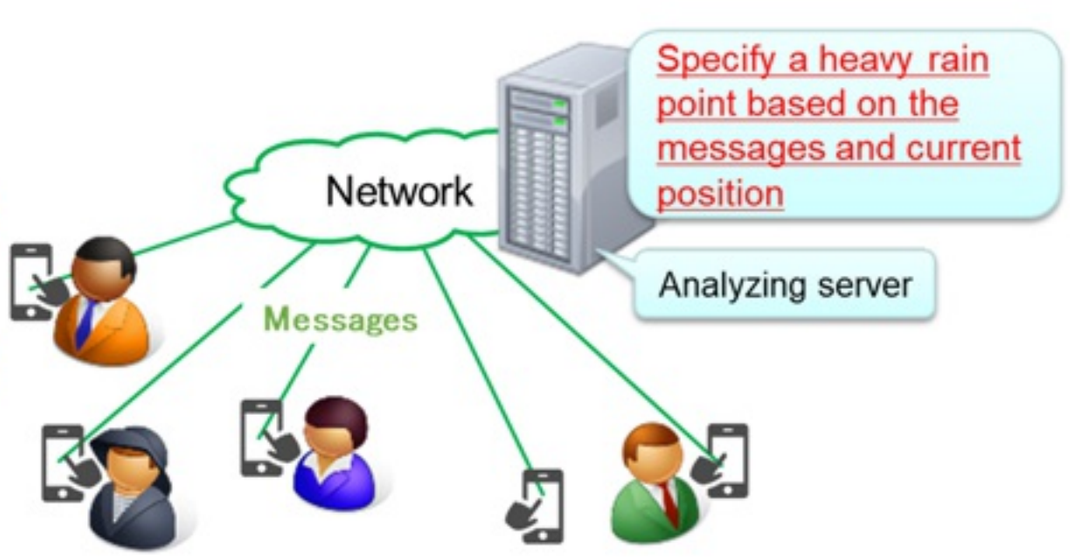
Suppose that the secondary prior art is to specify a heavy rain point based on the messages and current position.

Heavy rain point specifying system (cont.)

Primary prior art



Secondary prior art



- ✓ Primary prior art: Detecting failure of the wiper.
  Secondary prior art: Specifying a heavy rain point based on the messages.
  → They are different in technical field from each other.
  → They are different in problems to be solved each other.
  → They are different in operations and functions from each other.

Even I, as a person skilled in the art, wouldn't think to apply the secondary prior art to the primary prior art.

I understand, because the primary prior art and the secondary prior art are completely different in terms of technical field, problem to be solved, operation and function…

There is no motivation for applying the secondary prior art to the primary prior art.
→ Answer: Involve an inventive step

"Well-known art" is technical matter generally known in the relevant technical field.

First, as we've done in the previous cases, let's compare the claimed invention with the primary prior art and specify the identical features and the differences.

Now let's take a look at a case using a well-known art.

Cancer level calculation apparatus

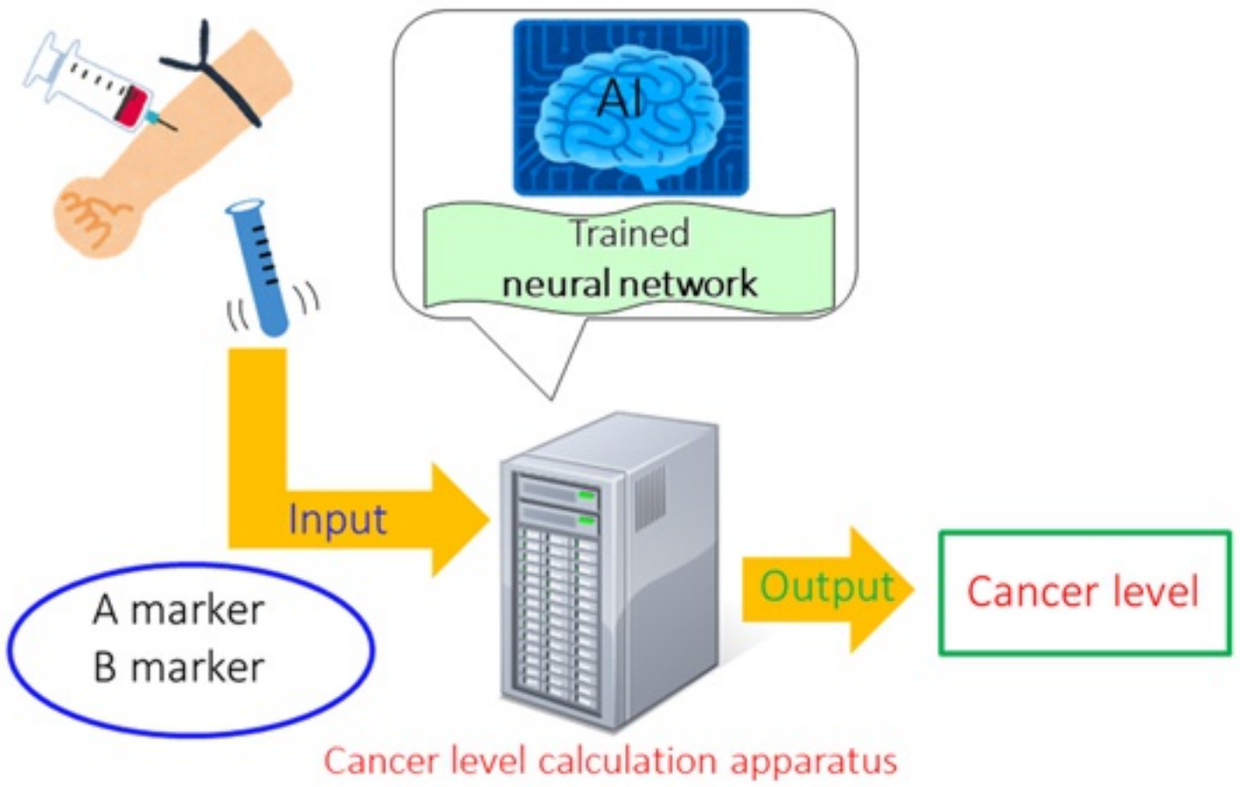
[Claim 1] (Examination Handbook Annex A, 5. Inventive step, Case 33)

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

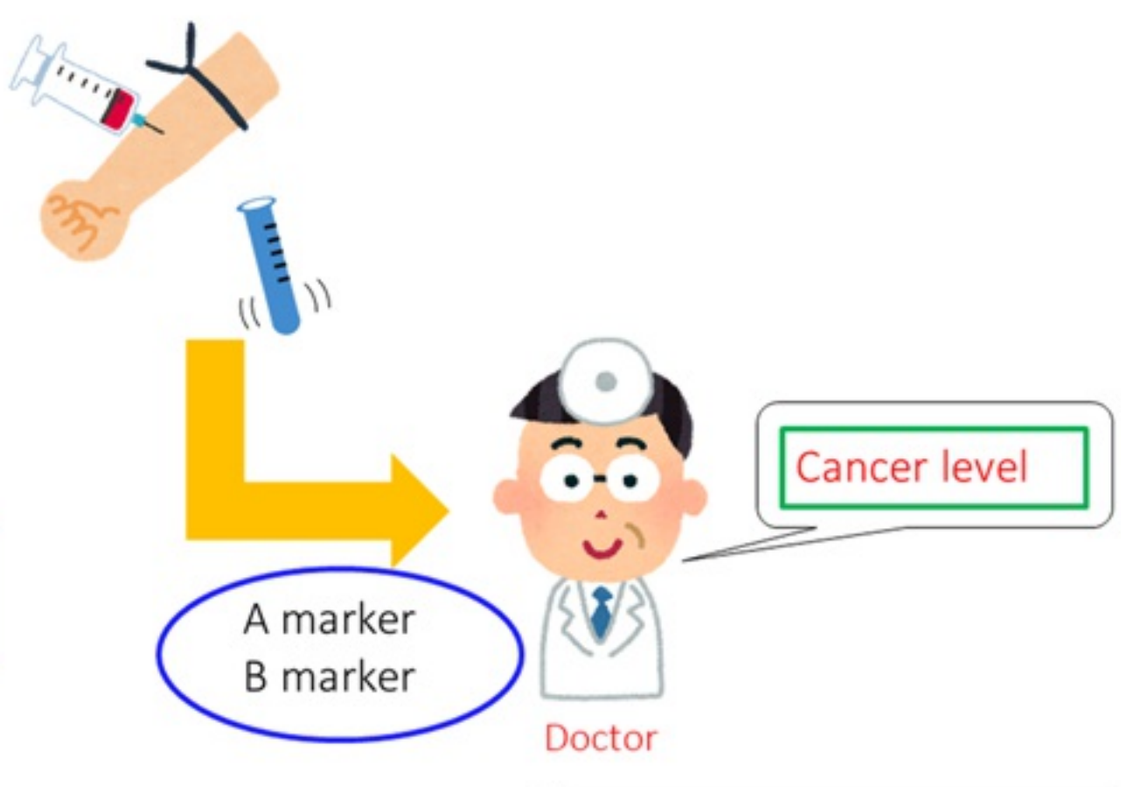
a cancer level calculation unit that calculates a possibility that a subject person has cancer, in response to an input of measured values of A marker and B marker that have been obtained through blood analysis of the subject person,

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.

Claimed invention



Primary prior art



The difference is whether the cancer level is calculated by AI or a doctor.

!!

The identical feature is the method of calculating the cancer level based on A and B markers.

Key points

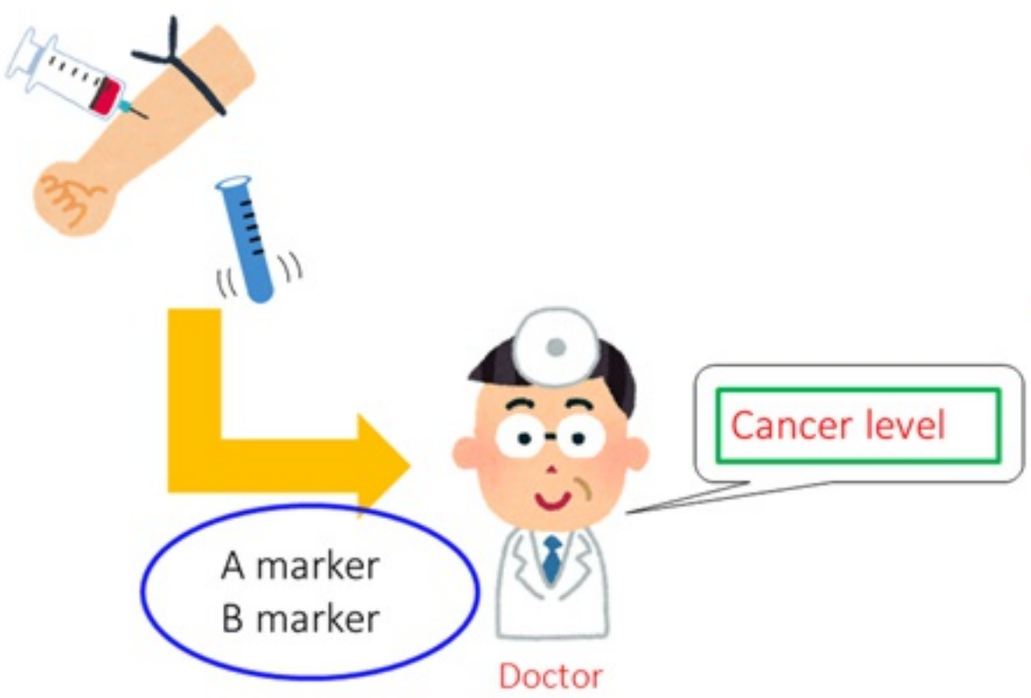
Is there a motivation to apply the well-known art to the primary prior art ?
If so, why?
Let's put aside the claimed invention for a moment and think about the above.

Can we say that a person skilled in the art would easily arrive at the claimed invention based on the primary prior art and the well-known art?

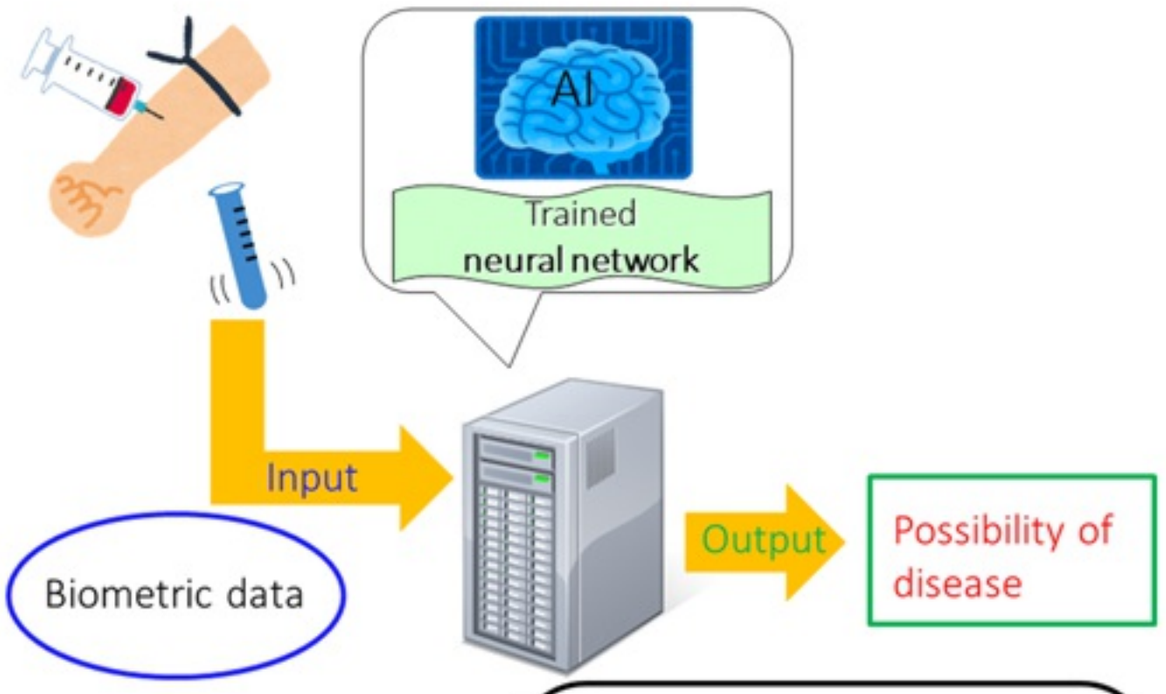
Suppose that it is a well-known art at the time of filing to have AI learn the relationship between biometric data and the possibility of disease, and have AI output the possibility of disease based on the subject's biometric data.

Cancer level calculation apparatus (conclusion)

Primary prior art



Well-known art



- ✓ Both the primary prior art and the well-known art relate to estimation of the possibility of disease.
  → They share a common problem to be solved.
- ✓ A person skilled in the art would easily conceive of systemizing a method of calculating the possibility of cancer, which has been carried out by a doctor, by applying the well-known art.

Well, now I know that we can estimate the level of cancer based on A and B markers.
Maybe I can let AI do it instead of a doctor.

A person skilled in the art

So even if it's a well-known art, the examiner will consider whether a person skilled in the art would arrive at the claimed invention.

- ✓ There is a motivation for applying the well-known art to the primary prior art.
- ✓ The effect of claimed invention is predictable by a person skilled in the art.

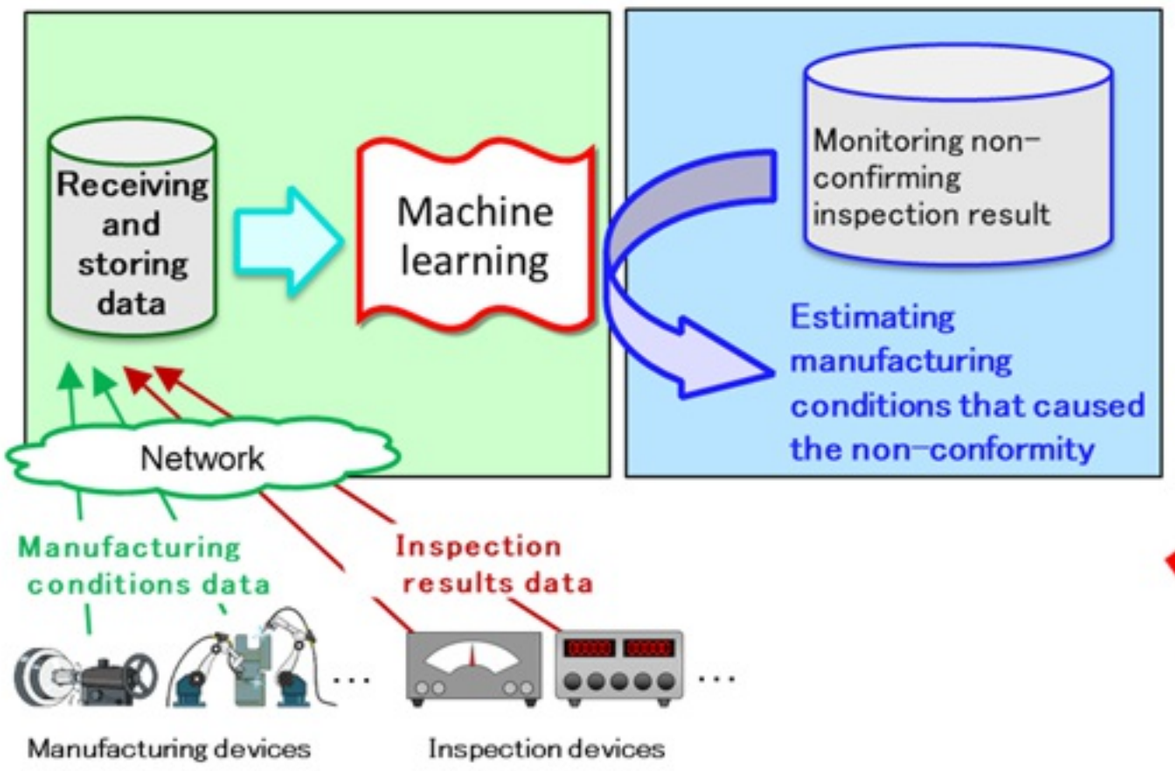
→ Answer: Lack an inventive step

In such a case, the claimed invention may lack an inventive step by the only one evidence of the primary prior art.

There is a case where no evidence is required to be shown as a well-known art because it is "so well-known".

Another example of lacking an inventive step from primary prior art and well-known art

Primary prior art



A quality management program of manufacturing lines which estimates a manufacturing condition that caused non-conformity using the trained neural network.

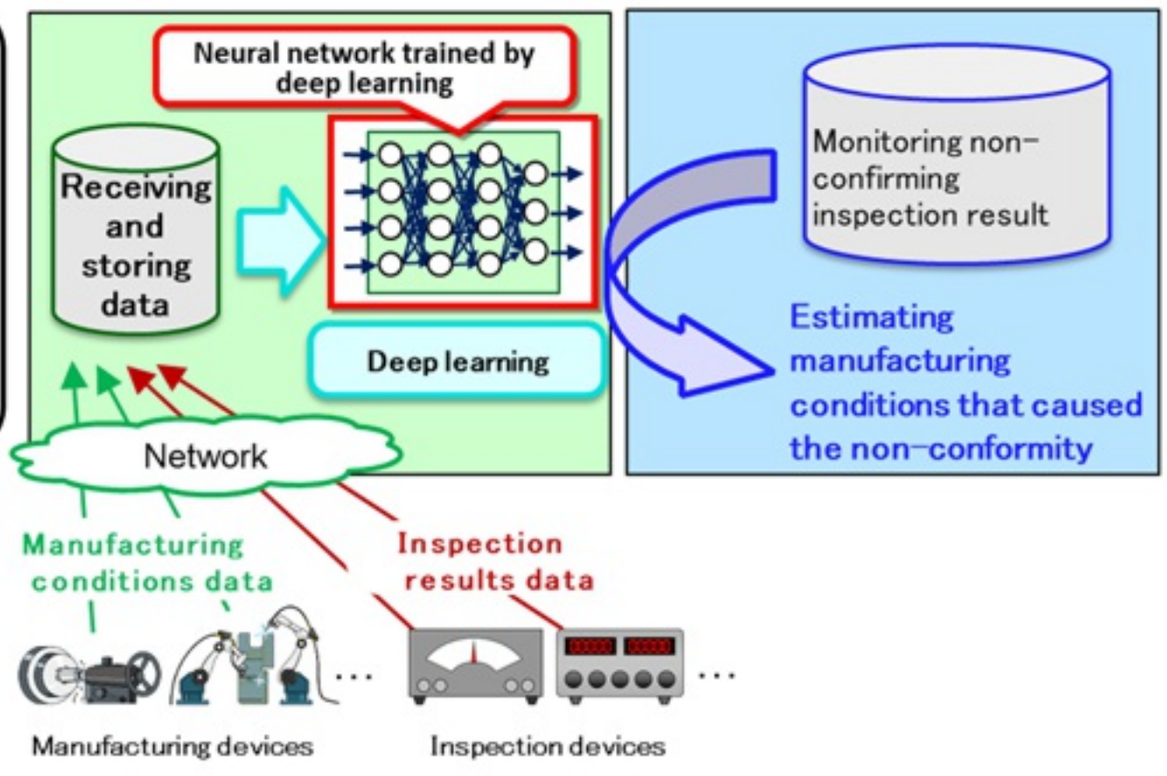
Well-known art

Learning AI through deep learning.

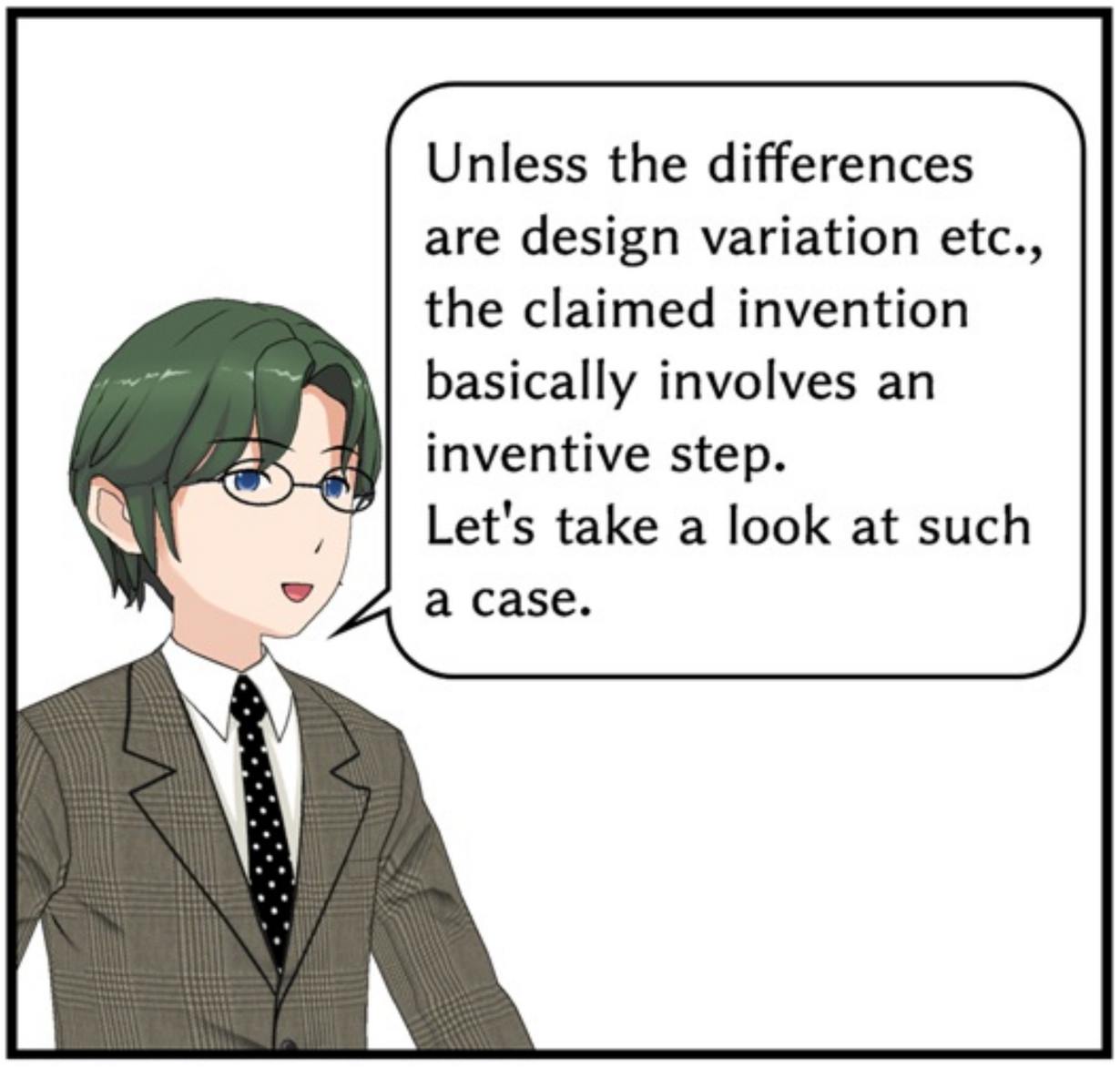
I wonder what happens if I apply deep learning to the primary prior art.

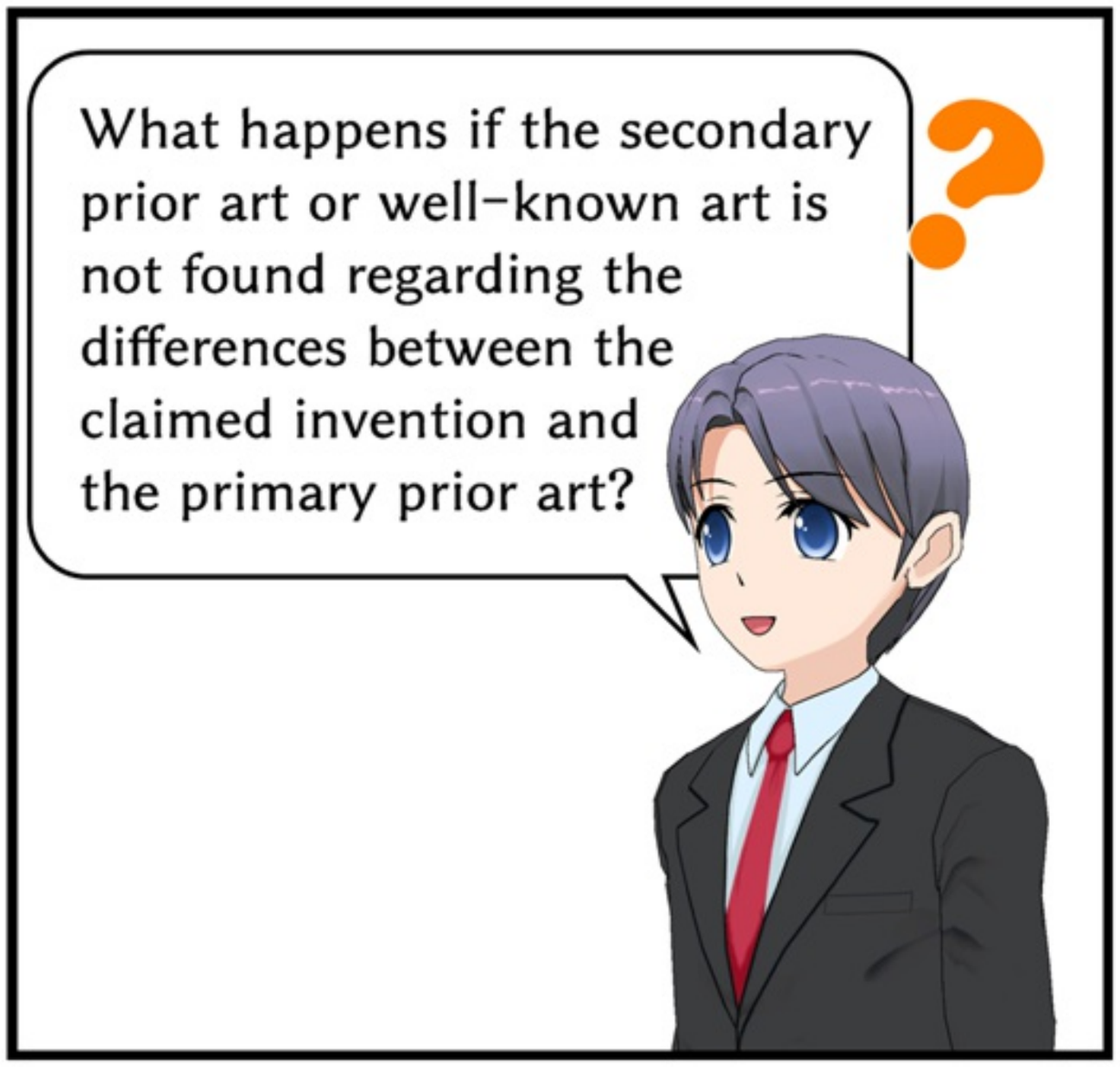
Claimed invention

It seems the effect of deep learning to increase estimation accuracy is also predictable for a person skilled in the art.



Answer: Lack an inventive step





Dementia stage estimation apparatus

[Claim 1] (Examination Handbook Annex A, 5. Inventive step, Case 36)

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;

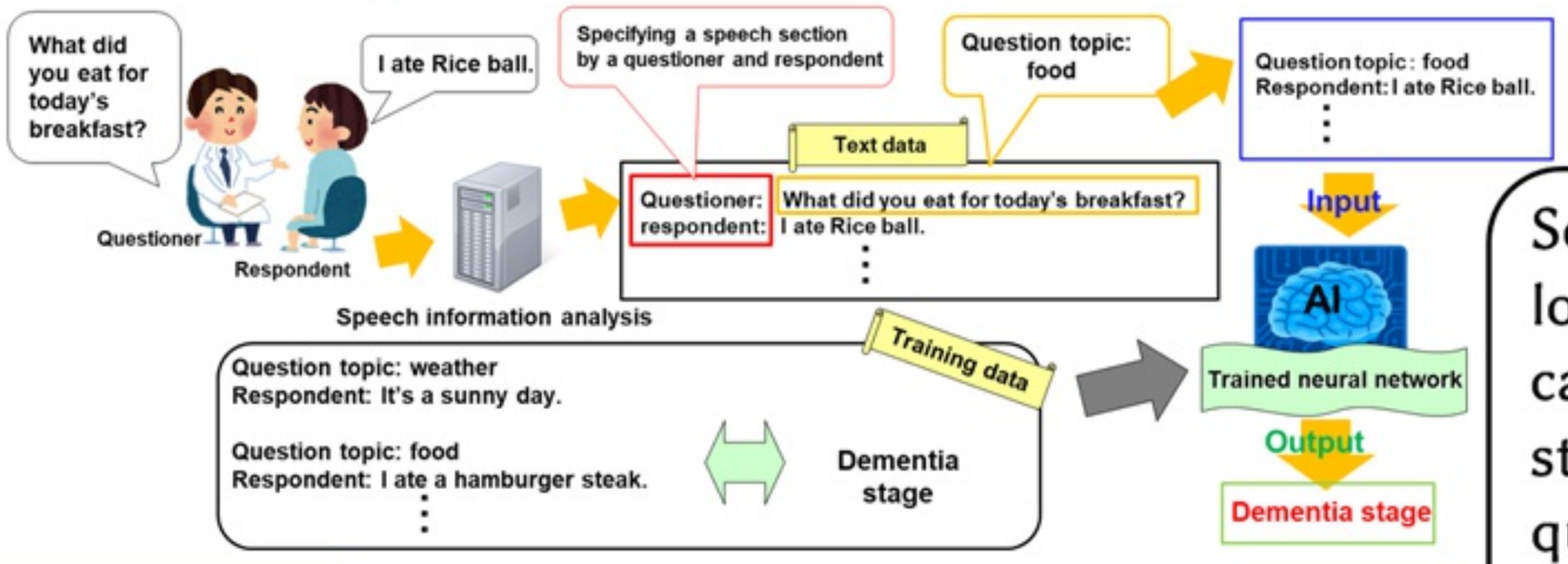
a speech recognition means for converting, through speech recognition, the speech information on the speech section by the questioner and the speech section by the respondent into text and then outputting a character string;

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,

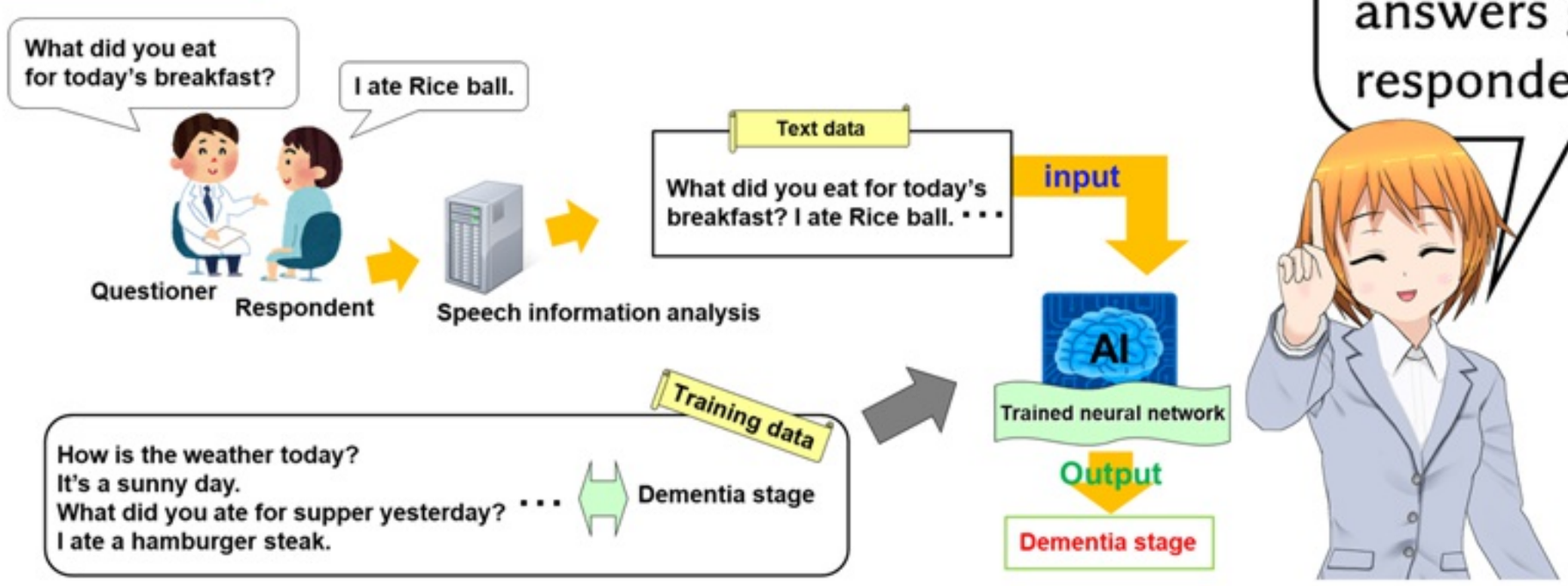
wherein the neural network is trained through machine learning using training data so as to output an estimated dementia stage, in response to an input of the character string of the speech section by the respondent in an associated manner with the question topic by the questioner.

Claimed invention



So, this invention does a lot of pre-processing to calculate the dementia stage based on the question topics asked by the questioner and the answers given by the respondent.

Primary prior art



Hmm

As long as the differences are not design variation etc., it involves an inventive step, right?

Suppose there is no prior art to estimate the dementia stage after pre-processing as in the claimed invention.
Can we say that it involves an inventive step?

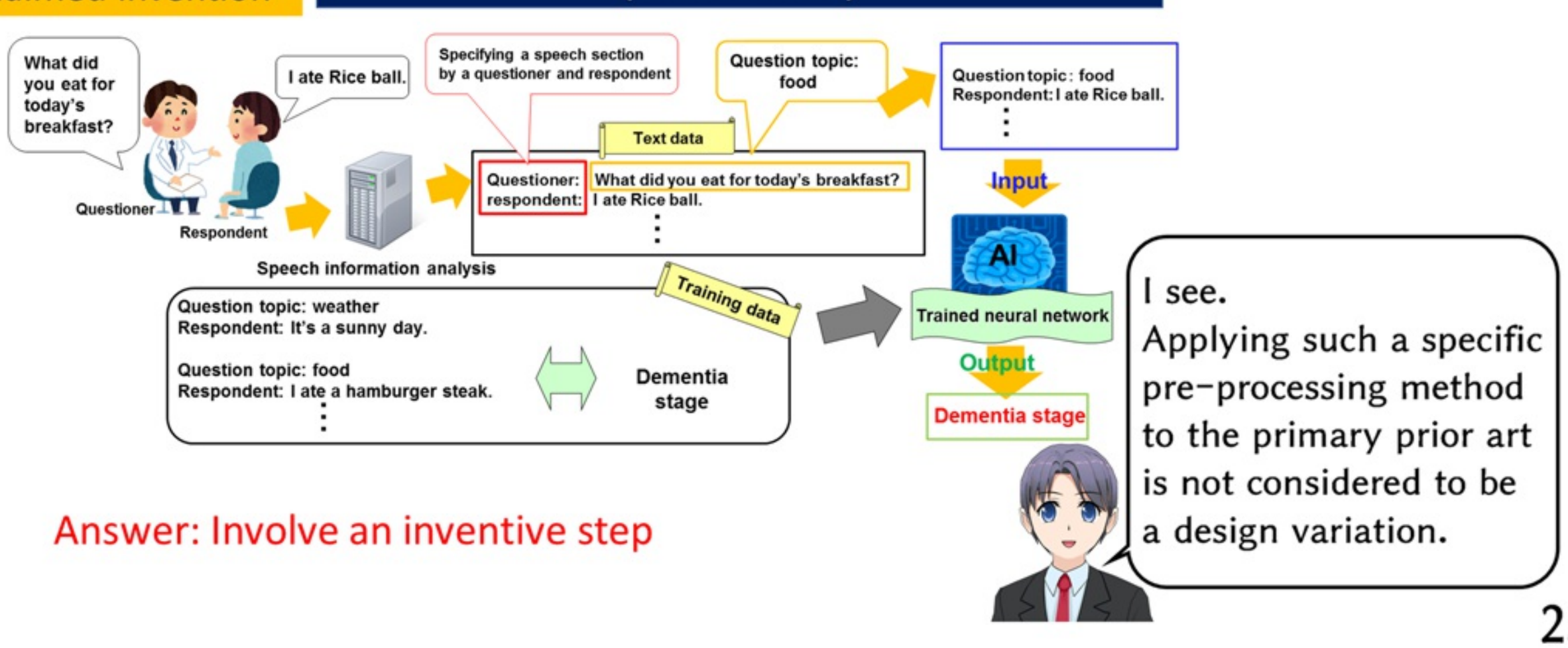
In general terms, yes, but the claimed invention discloses a specific pre-processing method that is effective in estimating the dementia stage.

Can we really say that applying such a specific method is a design variation?

But isn't it common to pre-process the training data to improve the accuracy of estimation?
Isn't it just a mere design variation?

Claimed invention

Dementia stage estimation apparatus (conclusion)

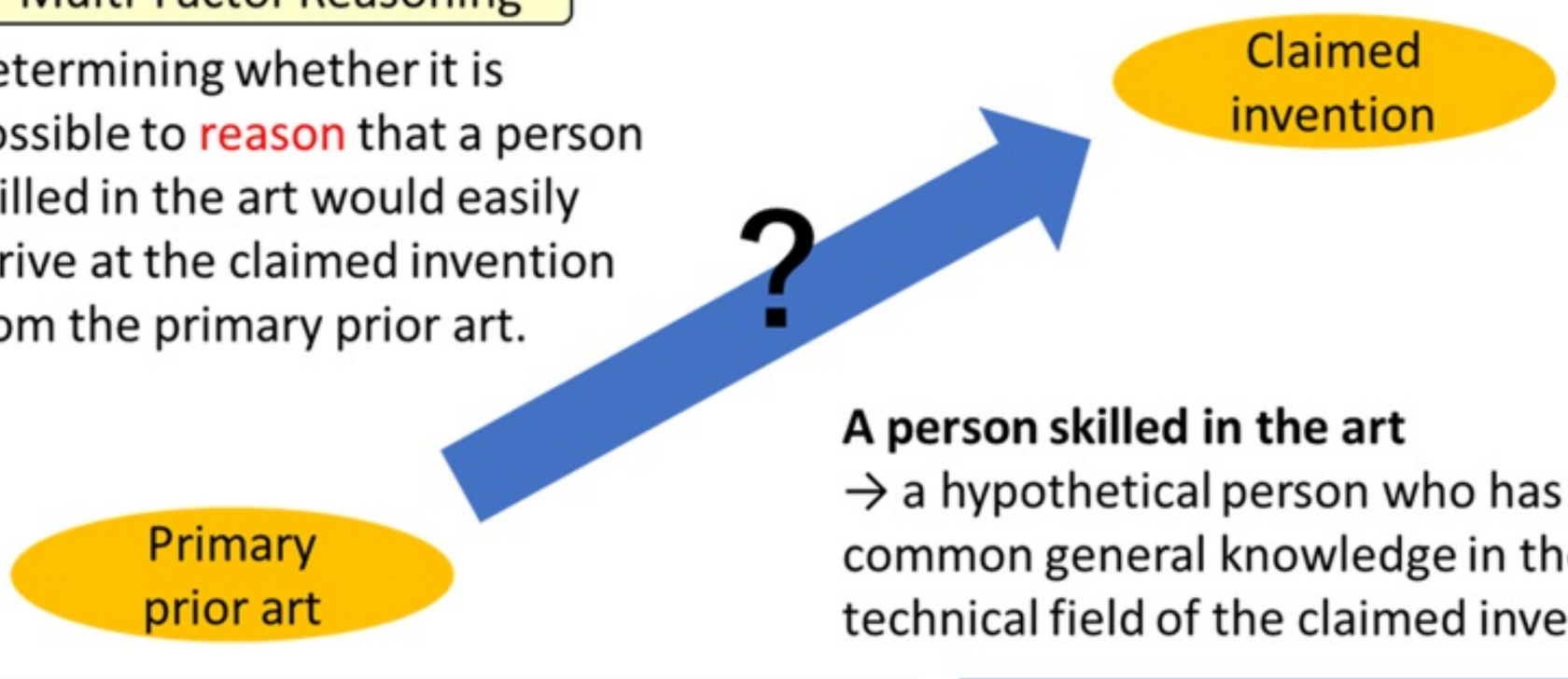


Answer: Involve an inventive step

Summary of Inventive Step

Multi-Factor Reasoning

Determining whether it is possible to reason that a person skilled in the art would easily arrive at the claimed invention from the primary prior art.



A person skilled in the art
→ a hypothetical person who has the common general knowledge in the technical field of the claimed invention.

Factors in support of the **non-existence** of an inventive step	Factors in support of the **existence** of an inventive step
1. Motivation for applying other prior art to primary prior art: (1) relation of technical fields; (2) similarity of problems to be solved; (3) similarity of operations or functions; or (4) suggestions shown in the content of the prior art **2. Design variation of primary prior art** **3. Mere aggregation of prior art**	**1. Advantageous effects** **2. Obstructive factors** Example: It is contrary to the purpose of the primary prior art to apply other prior art thereto.

- ✓ The examiner determines whether the claimed invention involves an inventive step by considering whether or not it could be reasoned that a person skilled in the art easily arrives at the claimed invention based on the prior art.
- ✓ Whether or not a person skilled in the art easily arrives at the claimed invention should be determined by assessing comprehensively various facts in support of the existence or non-existence of an inventive step.