Protecting
AI Inventions

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October 24, 2019

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Index: Patenting AI Inventions

1. Satisfying enablement requirements, and

2. Adding inventive step when adopting AI.

3. Suggestions for interviewing AI inventors

1 and 2 are cited from JPO Examination Guideline with our modifications

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Enablement requirements for training AI

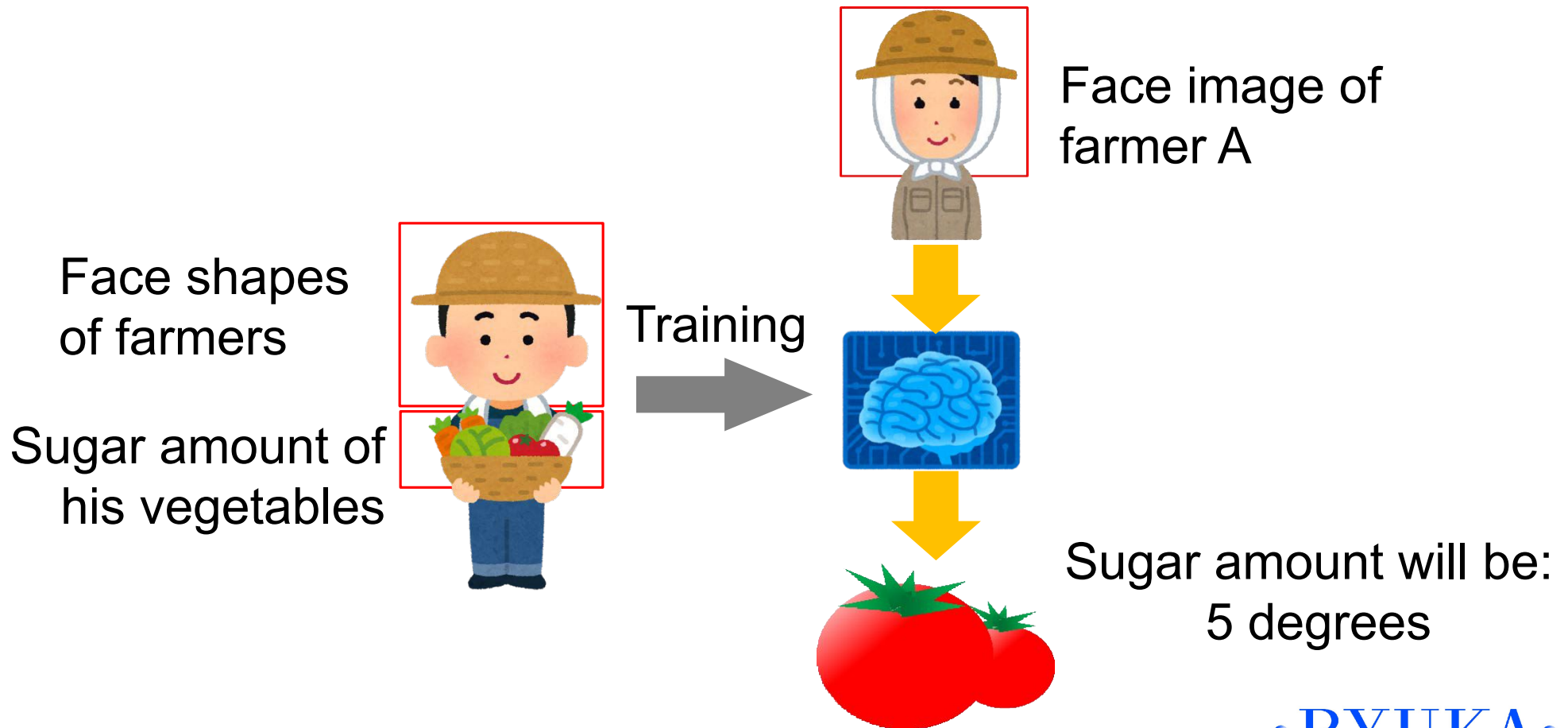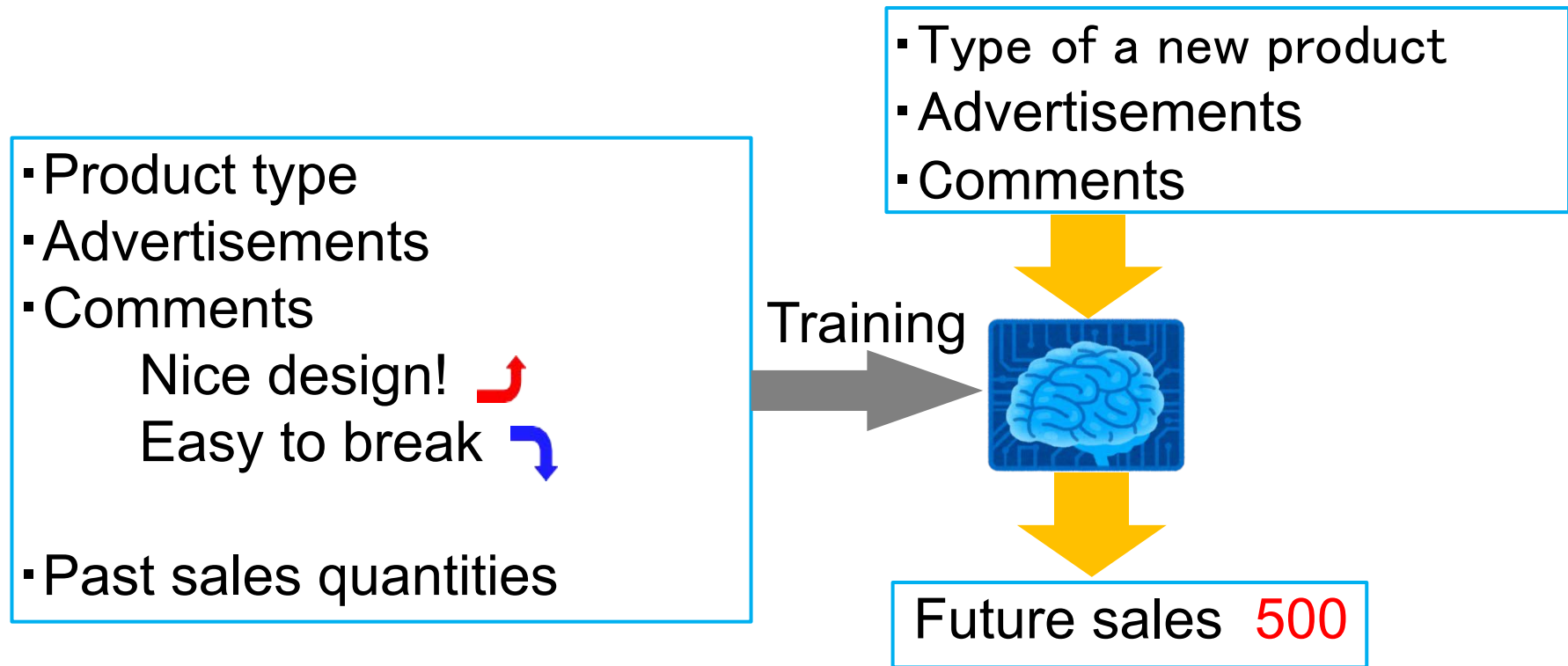| Satisfied	NOT Satisfied
It is understood that multiple training data have correlation:	
- by general knowledge	Correlation among training data is not presumed via general knowledge nor explained in the description.
- by explanation or statistic information in the description, or ⟷	
- by evaluation of output from learned AI model ⟷	A feature of a claimed product is estimated by AI, but there is no evaluation of the actual product and accuracy of AI estimation is not verified nor understood.

Lack of enablement

Correlation among training data is NOT expected via general knowledge NOR supported by description

Face image of farmer A

Face shapes of farmers

Sugar amount of his vegetables

Training

Sugar amount will be: 5 degrees

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Enablement is Satisfied: where the correlation among training data is presumed from a common knowledge, even if the specification does not disclose the correlation.

- Product type
- Advertisements
- Comments
    - Nice design!
    - Easy to break

- Past sales quantities

- Type of a new product
- Advertisements
- Comments

Training

Future sales 500

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Claim Example

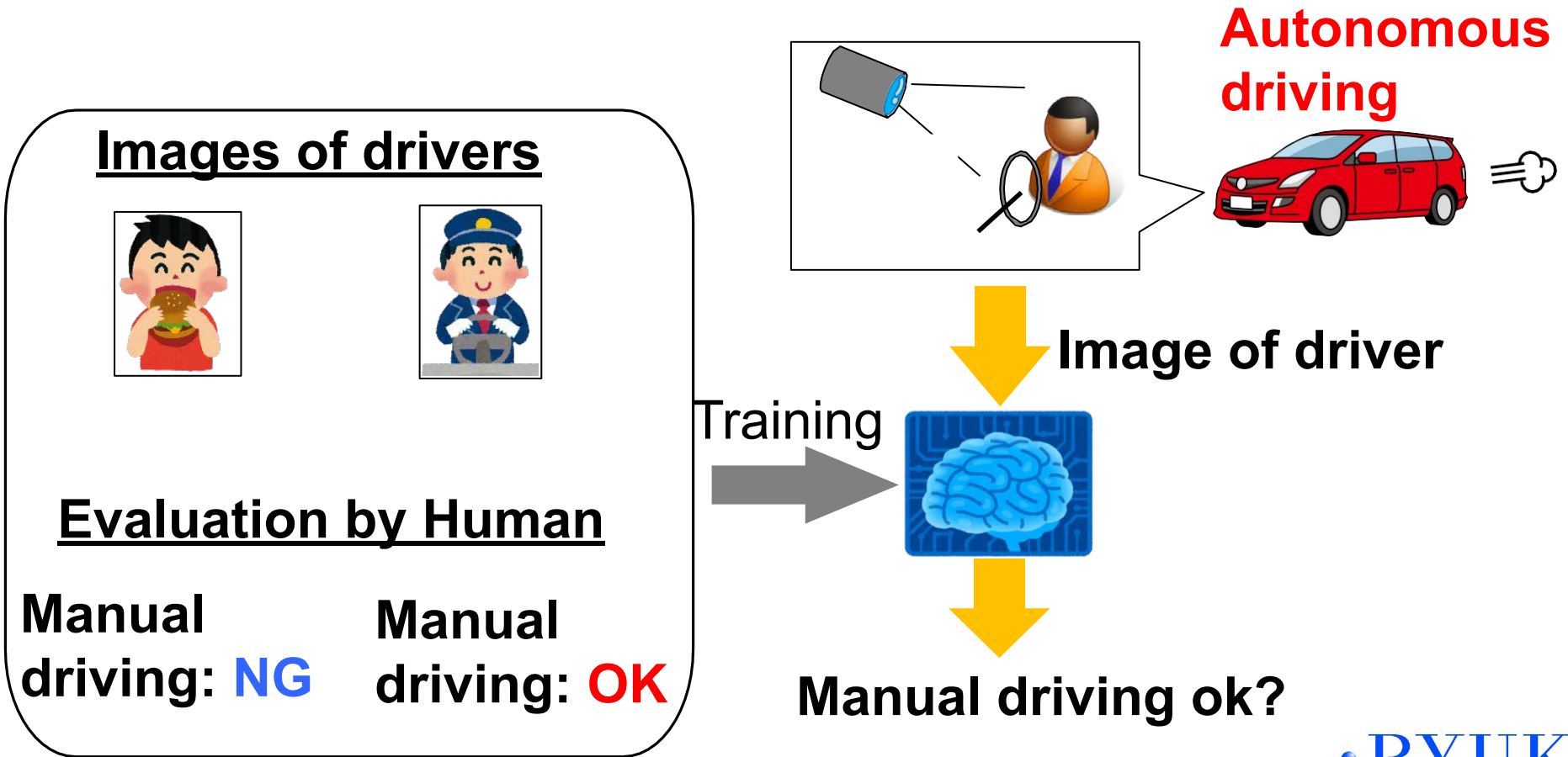A business plan design apparatus comprising:

a reception means for receiving a product type, web advertisements and comments;

a simulation means for simulating sales quantity of the product based on the product type, web advertisements and comments, using an estimation model that has been trained through machine learning with training data containing product types, web advertisements and comments of products and past sales quantities of the products; and

an output means for outputting the sales quantity.

Enablement is satisfied:

even if training data is **labeled by human**, provided that the correlation is understood via general knowledge.

Images of drivers

Evaluation by Human

Manual driving: NG

Manual driving: OK

Training

Autonomous driving

Image of driver

Manual driving ok?

Claim Example .... cited from the Exam Guideline with modification

An autonomous driving system comprising:

an image capturing unit that is positioned to capture an image of a driver; and

a quick reaction capability estimation unit that inputs the image to a trained learning model and obtains a quick reaction capability of the driver from a trained learning model, the trained learning model having been trained through machine leaning to estimate a quick reaction capability of the driver,

wherein switching from an autonomous driving to a manual driving is prohibited, in case the quick reaction capability is below a predetermined value.

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Claim 2: Enable, because correlation among training data is supported in the spec. by data, but
Claim 1: Not enabled, because the correlation is not supported by the spec. nor presumed.
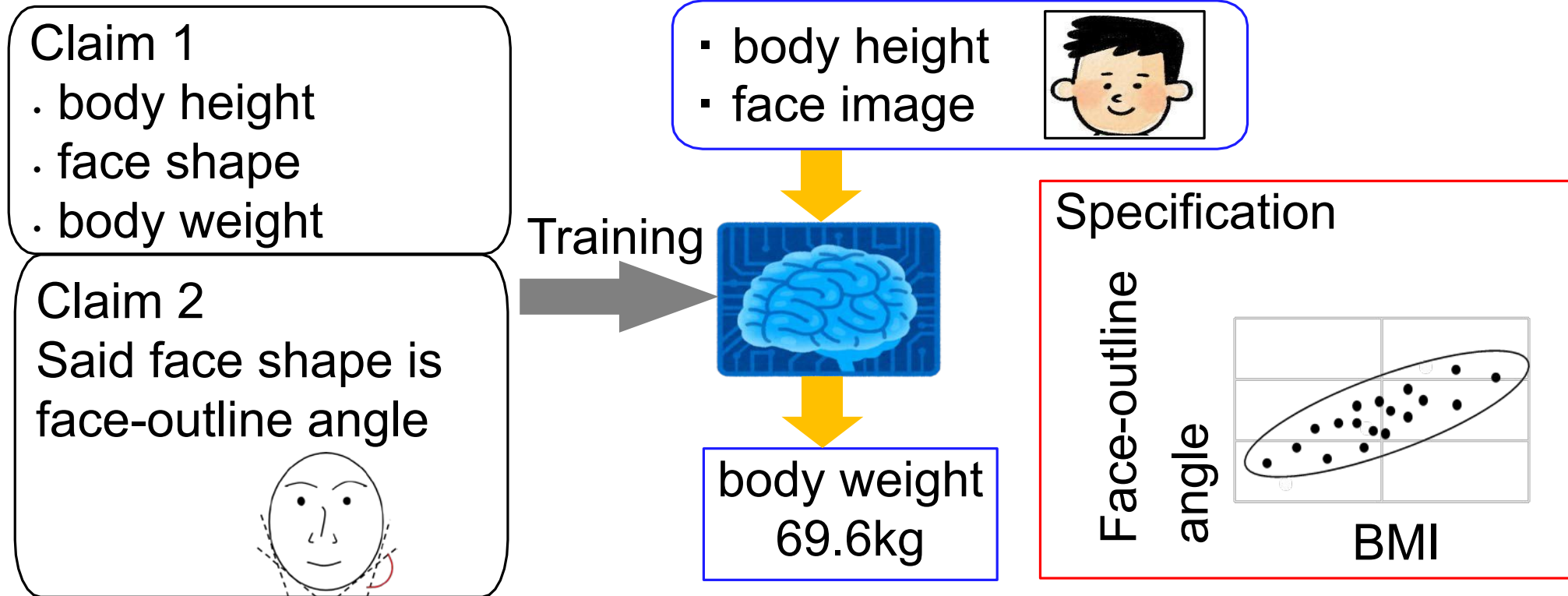
Claim Example …. cited from the Exam Guideline with modification

1. A body weight estimation system comprising:

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

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

a feature obtainment means for obtaining a feature value of a face shape by analyzing the face image; and
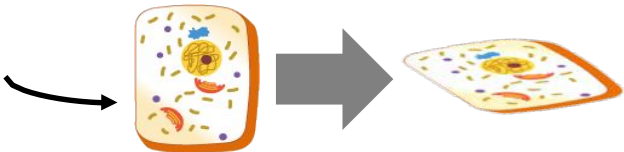
a processing means for outputting an estimated body weight of the person based on the feature value and the height of the person, using the model.

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

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Enablement is satisfied, if a correlation among training data is verified by examination results of AI output.
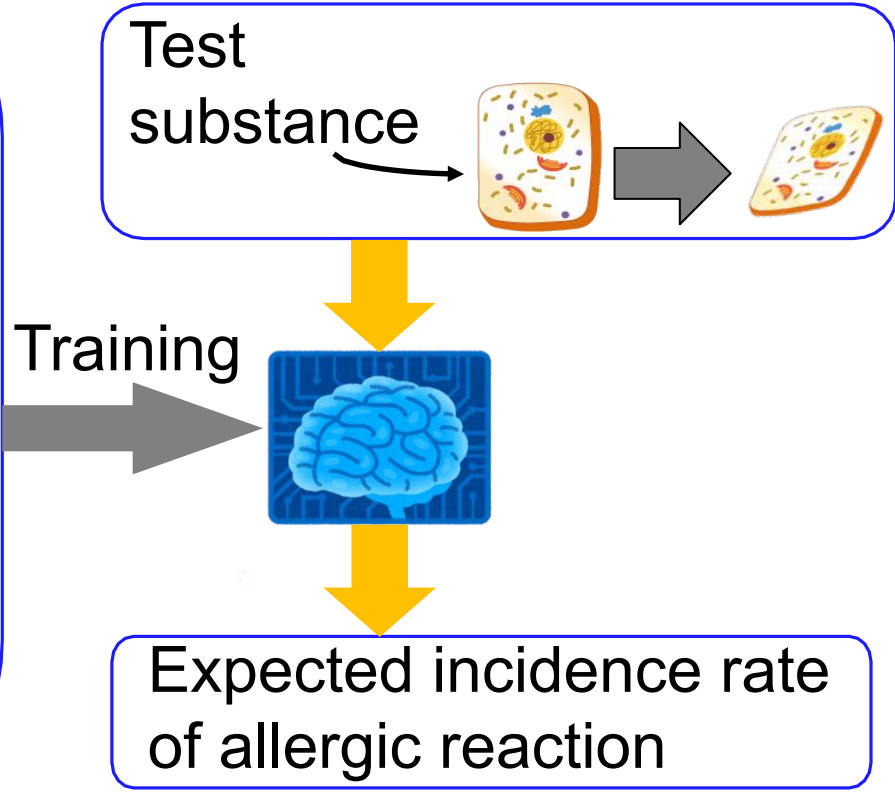
Claim 1 (**Not Enable**)

Known substance

Incidence rate of allergic reaction

Claim 2 (**Enabled**)
Said allergic reaction is contact dermatitis

Test substance

Training

Expected incidence rate of allergic reaction

Specification discloses examination results that verify the expected contact-dermatitis rate by the test substance

Non-Enable Claim Example

…cited from the JPO exam guideline

1. A method for estimating an allergy incidence rate of a test substance comprising:

inputting a training data to an artificial intelligence 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 substance is separately added to the culture solution and the incidence rate of allergic reaction caused by each substance is 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 obtained by said obtaining; and

causing the trained artificial intelligence model to calculate a scoring data of an incidence rate of human allergic reaction.
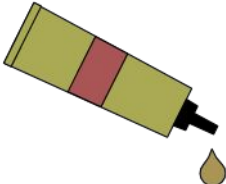
2. The method for estimating an allergy incidence rate as claimed in Claim 1,

wherein the allergic reaction is contact dermatitis.

A product estimated by AI is not enabled, unless the actual product or estimation accuracy is verified.

Q

Anaerobic adhesive with a curing strength equal to 30 %?

Composition of anaerobic adhesive

Curing strength within 5 minutes of curing

Curing strength after 24 hours

Training

A

Anaerobic adhesive comprising:
compound A ○ %
compound B △%

Not Patentable

No disclosure of actual production or measurement of the curing strength.

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Satisfying Enablement Requirements

by explaining that multiple training data have correlation via:

- explanation based on general knowledge

- statistics among training data, or

- evaluation results of output from learned AI model

Adding Inventive Step

NOT Inventive	Inventive
Merely converting human operations, or other known methods to AI	**Adding new training data, or**
Adding known relevant data for training, which provides only known effects	**preprocessing training data,**
	which provides significant effects

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Not Inventive: Mere conversion to AI

Prior art estimates power generating capacity by regression
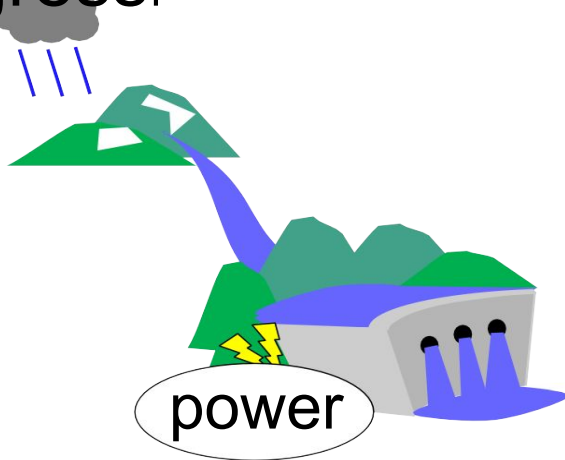
power

Past water inflow into a dam
Water flow of the river upper stream
Precipitation around the upper stream

· Past water inflow into a dam
· Water flow of the river upper stream
· Precipitation around the upper stream

Later power generation capacity in the past

Training

Expected power generation capacity

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Claim Example .... cited from the Exam Guideline with modification

1. An estimation system of a power generating capacity comprising:

a neural network in which input contains a precipitation amount of a river upper stream, a water flow of the upper stream, and a water inflow into a dam during a period between a reference time and a predetermined time before the reference time, and output contains a power generating capacity after the reference time;

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

an estimation unit that inputs data to the neural network being trained by the machine learning unit by setting current time as the reference time, and calculates power generating capacity.

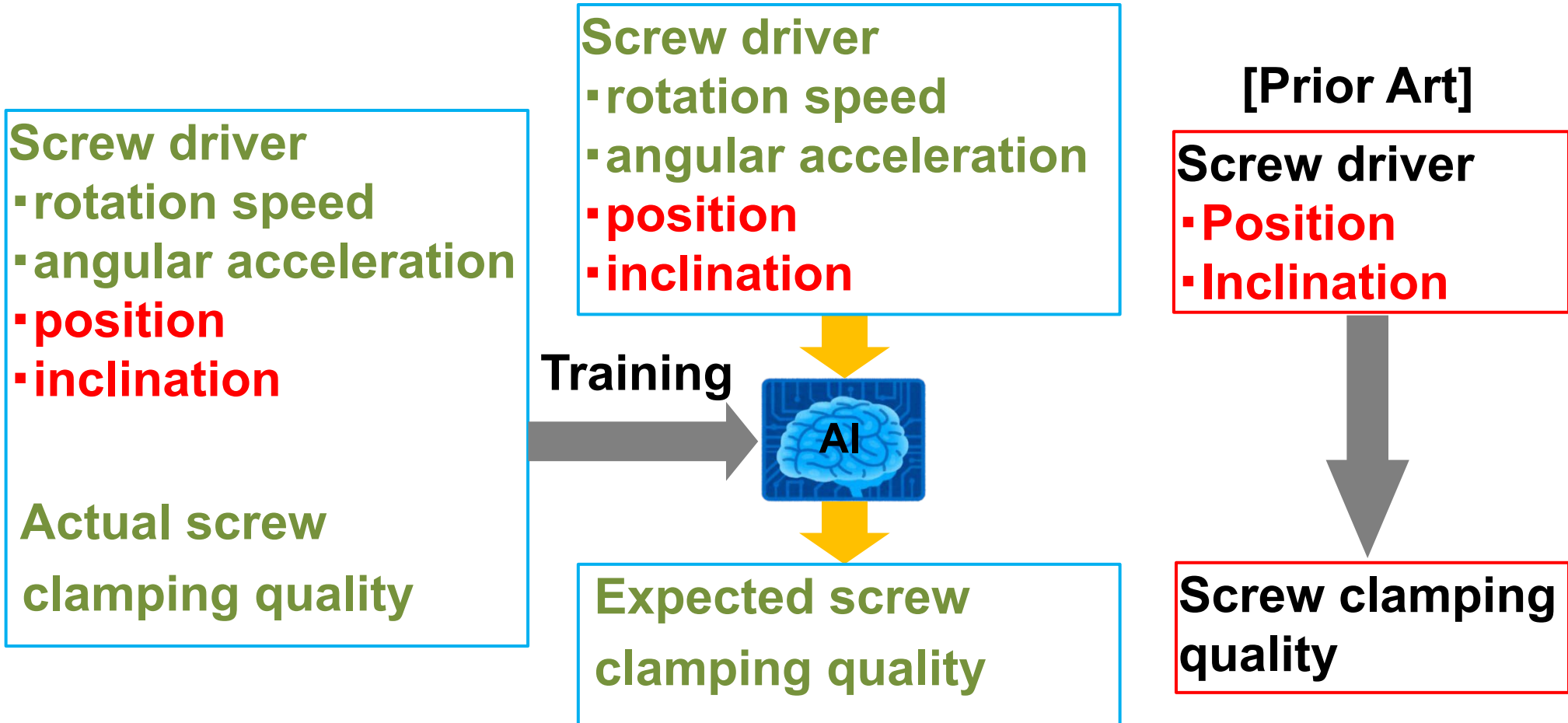**Inventive:** where a new type of input provides significant technical effects

2. The estimation system of a power generating capacity as in Claim 1, wherein the input further contains temperature of upper area during the predetermined period.

…. cited from the Exam Guideline with modification

This makes estimation accurate, taking increase of inflow rate due to meltwater in spring into consideration.
No prior art considered the past temperature.

Not Inventive: Mere combination of known AI (green) and known relevant parameter (red)

Screw driver
- rotation speed
- angular acceleration
- position
- inclination

Actual screw clamping quality

Screw driver
- rotation speed
- angular acceleration
- position
- inclination

Training

AI

Expected screw clamping quality

[Prior Art]

Screw driver
- Position
- Inclination

Screw clamping quality

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Prior AI

Voice recognition
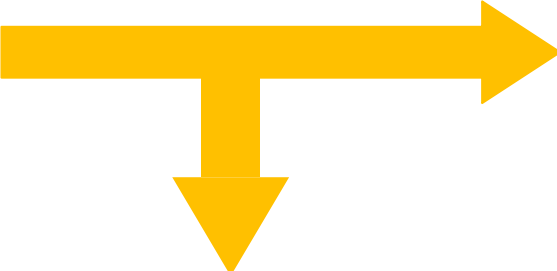
"What did you eat for today's breakfast? I ate an egg."

"How is the weather today? It's a sunny day. What did you eat yesterday? I ate hamburger."

Actual dementia stage

Training

Expected dementia stage

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Inventive: where pre-processing of training data provides significant effects

Specifying
questioner voice & patient voice

Specifying question topic

What did you eat yesterday?

I ate an egg.

Question topic: Food
Patient: I ate an egg.

For training

In use

Question topic: Weather
Patient :   It's a sunny day.
Question topic: Food   …
Patient :   I ate hamburger.

Actual dementia stage

Expected dementia stage

Claim Example .... cited from the Exam Guideline with modification

A dementia stage estimation apparatus comprising:

a voice analyzer for specifying voices of a questioner and patient;

a voice recognition means for converting the voices of questioner and patient into question text and patient text, respectively;

a question topic specifying means for specifying a question topic based on the question text; and

a dementia stage determination means for inputting the question topic and the patient text to a trained neural network and determining a dementia stage of the patient,

wherein the neural network is trained through machine learning using training data so as to output an estimated dementia stage in response to a question topic and patient text.

Our Suggestions

Interviewing inventors aiming for enablement and inventive step

Suggestion 1 for interviewing AI inventors
Seeking for **preprocess** of training data

Ex.) Sound of engine for detecting malfunction

       Adjusting volume?

       Filtering specific sonic band?

       Cutting noise?

Ex.) Image of airport for landing navigation
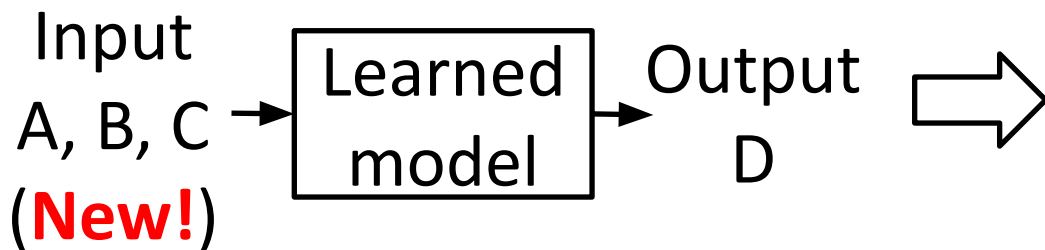
       Adjusting brightness?

       Filtering out cloud?
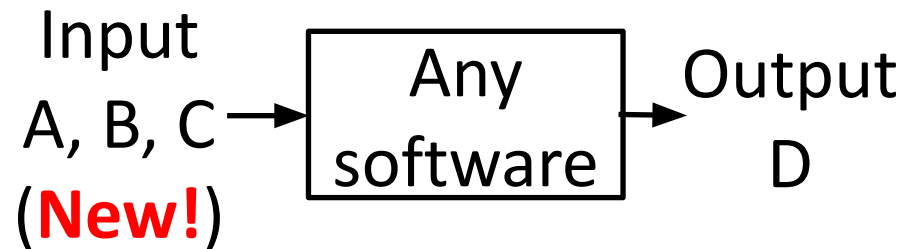
       Offsetting vibration?

Suggestion 2: Claiming with new input

If a new (combination of) input provides inventive step, it might be patentable even as non-AI.

Proposed invention   Might also be inventive

Input
A, B, C → [Learned model] → Output D   ⟹   Input A, B, C → [Any software] → Output D
(New!)   (New!)

●Asking the inventor for reasons and test data explaining the effects of new input, and writing them in the specification.

●Any other comparable parameters?

Claiming with a word that covers comparable parameters

Suggestion 3 for interviewing AI inventors

Inventors often use open source libraries of AI.

Asking specific parameters given to the AI libraries
- for finding any new parameters

Asking how each parameter is prepared
- for finding any pre-process

Asking possible further improvements of input and pre-process

Suggestion 4: Avoiding divided infringement of learning machine and machine in use

- Leaning machine could be on cloud.

- Ideal to claim each machine separately
    ex. Slides 6 (Sales) and 8 (Autonomous Driving)
- The combination should also be considered.
    ex. Slide 10 (Body Weight)

- Both machines should be described in the specification for satisfying enablement requirements.

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Suggestion 5: Claiming interfaces for easily proving infringements

∵ It is difficult to prove internal processes & no discoveries in Japan

Input   Input parameters
         How to provide training and actual input (ex. sensors)
         How to label training data (ex. positive/negative)

Output   Output parameters
         How to use output (ex. controlling something)

Control   Control of training process
             ex. alarming failed judgements (ex. downhill curve)
         Control of use process
             ex. notifying of difficult circumstance for own judgements

Thank you

about us:

Celebrated 20th year in 2018.
39 attorneys, 120 in total

They say:
Rising Star in Japan IP,   ILASA
Top 5 Japan Patent Firm,   Asia IP
Top 10 Japan Trademark Firm,   Asia IP
Top 20 Japan Patent Firm,   MIP
Top 20 Japan Trademark Firm,   MIP

We commit to proactive communication aiming for deeper understanding of our clients and creative processes.

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