a neural network, thereby speeding up the learning.

SUMMARY

[0004]

However, in the technique of Japanese Patent No. 3082548, there is a problem in that it is necessary to learn the correlations of facilities in advance and it is impossible to learn an alarm alone.

[0005]

The present invention has been made in view of such a problem, and embodiments of the present invention seek to provide a technique for estimating a root cause based on a plurality of output signals output from devices to be managed.

[0006]

According to a first aspect of the present invention, there is provided an information processing apparatus of the present invention includes: a reception module configured to receive selection of an output signal corresponding to a root cause from a group including a plurality of output signals, the plurality of output signals being obtained from a plurality of devices to be managed and being obtained in a predetermined period; a replacement module configured to replace a selection result received by the reception module with a combination of the selection results in two output signals, the

selection result being corresponding to the group, the two output signals being selected from the plurality of output signals; and a model generation module configured to generate a ranking model of the plurality of output signals based on the selection results after the replacement, wherein the model generation module

sets an arrangement order of the plurality of output signals as an arrangement order of each of a row and a column,

generates a matrix in which selection results in two output signals obtained by the replacement module are used as values of components corresponding to ranks of the respective two output signals,

generates the ranking model by solving a problem of maximizing a value of an upper triangle including components above diagonal components of the matrix,

generates the ranking model by a heuristic method,

arranges the plurality of output signals in a predetermined arrangement order and changes a rank of an output signal of a processing target among the plurality of output signals in accordance with a predetermined condition to generate a plurality of arrangement orders,

obtains a value of the upper triangle of the matrix corresponding to each of the plurality of arrangement orders,

obtains one of the plurality of arrangement orders as the ranking model based on the value of the upper triangle, and

fixes ranks of at least a part of output signals that have not been selected as a root cause to ranks lower than ranks of output signals that have been selected as a root cause and changes ranks of output signals that are not fixed.

[0007]

There is disclosed an information processing apparatus including: an acquisition module configured to acquire a plurality of first output signals that are estimation targets for a root cause; and an estimation module configured to estimate an output signal that is a root cause from among the plurality of output signals based on a ranking model generated by replacing a selection result of an output signal that is a root cause in a group including a plurality of output signals obtained in a predetermined period of time with combinations of selection results in two output signals selected from among the group.

[0008]

According to a second aspect of the present invention, there is provided an information processing method executed by an information processing apparatus, the information processing method including: a reception step of receiving selection of an output signal corresponding to a root cause from a group including a plurality of output signals, the plurality of output

signals being obtained from a plurality of devices to be managed and being obtained in a predetermined period; a replacement step of replacing a selection result received by the reception module with a combination of the selection results in two output signals, the selection result being corresponding to the group, the two output signals being selected from the plurality of output signals; and a model generation step of generating a ranking model of the output signal based on the selection results after the replacement, wherein the model generation step further comprising:

setting an arrangement order of the plurality of output signals as an arrangement order of each of a row and a column,

generating a matrix in which selection results in two output signals obtained by the replacement module are used as values of components corresponding to ranks of the respective two output signals,

generating the ranking model by solving a problem of maximizing a value of an upper triangle including components above diagonal components of the matrix,

generating the ranking model by a heuristic method,

arranging the plurality of output signals in a

predetermined arrangement order and changes a rank of an output signal of a processing target among the plurality of output signals in accordance with a predetermined condition to generate a plurality of arrangement orders,

obtaining a value of the upper triangle of the matrix corresponding to each of the plurality of arrangement orders,

obtaining one of the plurality of arrangement orders as the ranking model based on the value of the upper triangle, and

fixing ranks of at least a part of output signals that have not been selected as a root cause to ranks lower than ranks of output signals that have been selected as a root cause and changes ranks of output signals that are not fixed.

[0009]

There is disclosed an information processing method executed by an information processing apparatus, the information processing method including: an acquisition step of acquiring a plurality of first output signals that are estimation targets for a root cause; and an estimation step of estimating an output signal that is a root cause from among the plurality of output signals based on a ranking model generated by

replacing a selection result of an output signal that is a root cause in a group including a plurality of output signals obtained in a predetermined period of time with combinations of selection results in two output signals selected from among the group.

[0010]

According to a third aspect of the present invention, there is provided a program causing a computer to function as: a reception module configured to receive selection of an output signal corresponding to a root cause from a group including a plurality of output signals, the plurality of output signals being obtained from a plurality of devices to be managed and being obtained in a predetermined period; a replacement module configured to replace a selection result received by the reception module with a combination of the selection results in two output signals, the selection result being corresponding to the group, the two output signals being selected from the plurality of output signals; and a model generation module configured to generate a ranking model of the plurality of output signals based on the selection results after the replacement, wherein the model generation module

sets an arrangement order of the plurality of output signals as an arrangement order of each of a row and a column,

generates a matrix in which selection results in two output signals obtained by the replacement module are used as values of components corresponding to ranks of the respective two output signals,

generates the ranking model by solving a

problem of maximizing a value of an upper triangle including components above diagonal components of the matrix,

generates the ranking model by a heuristic method,

arranges the plurality of output signals in a predetermined arrangement order and changes a rank of an output signal of a processing target among the plurality of output signals in accordance with a predetermined condition to generate a plurality of arrangement orders,

obtains a value of the upper triangle of the matrix corresponding to each of the plurality of arrangement orders,

obtains one of the plurality of arrangement orders as the ranking model based on the value of the upper triangle, and

fixes ranks of at least a part of output signals that have not been selected as a root cause to ranks lower than ranks of output signals that have been selected as a root cause and changes ranks of output signals that are not fixed.

[0011]

There is disclosed a program causing a computer to function as: an acquisition

module configured to acquire a plurality of output signals that are estimation targets for a root cause; and an estimation module configured to estimate an output signal that is a root cause from among the plurality of output signals based on a ranking model generated by replacing a selection result of an output signal that is a root cause in a group including a plurality of output signals obtained in a

What is claimed is:

1. An information processing apparatus comprising:

a reception module configured to receive selection of an output signal corresponding to a root cause from a group including a plurality of output signals, the plurality of output signals being obtained from a plurality of devices to be managed and being obtained in a predetermined period;

a replacement module configured to replace a selection result received by the reception module with a combination of the selection results in two output signals, the selection result being corresponding to the group, the two output signals being selected from the plurality of output signals; and

a model generation module configured to generate a ranking model of the plurality of output signals based on the selection results after the replacement, wherein the model generation module

sets an arrangement order of the plurality of output signals as an arrangement order of each of a row and a column,

generates a matrix in which selection results in two output signals obtained by the replacement module are used as values of components corresponding to ranks of the respective two output signals,

generates the ranking model by solving a

problem of maximizing a value of an upper triangle including components above diagonal components of the matrix,

generates the ranking model by a heuristic method,

arranges the plurality of output signals in a predetermined arrangement order and changes a rank of an output signal of a processing target among the plurality of output signals in accordance with a predetermined condition to generate a plurality of arrangement orders,

obtains a value of the upper triangle of the matrix corresponding to each of the plurality of arrangement orders,

obtains one of the plurality of arrangement orders as the ranking model based on the value of the upper triangle, and

fixes ranks of at least a part of output signals that have not been selected as a root cause to ranks lower than ranks of output signals that have been selected as a root cause and changes ranks of output signals that are not fixed.

2. The information processing apparatus according to claim 1, further comprising

a group generation module configured to generate the group based on a time of occurrence of the output signal, wherein

the reception module receives selection of the output signal corresponding to the root cause in the group generated by the group generation module.

3. The information processing apparatus according to claim 1, wherein the model generation module selects each of the plurality of output signals as a processing target and changes a rank of the output signals of the processing target at regular intervals to generate the plurality of arrangement orders.

4. The information processing apparatus according to claim 1, wherein the model generation module selects two output signals among the plurality of output signals as processing targets, and exchanges ranks of the two output signals of the processing targets to generate the plurality of arrangement orders.

5. The information processing apparatus according to any one of claims 1 to 4, wherein when the reception module receives selection of the output signal corresponding to the root cause in a newly obtained group of output signals,

the model generation module updates the ranking model in response to a selection result of an output signal by the reception module.

6. The information processing apparatus according to any one of claims 1 to 5, further comprising

an estimation module configured to estimate, based on a plurality of output signals of estimation targets for the root cause and the ranking model, an output signal that is the root cause from among the plurality of output signals of the estimation targets.

7. An information processing method executed by an information processing apparatus, the information processing method comprising:

a reception step of receiving selection of an output signal corresponding to a root cause from a group including a plurality of output signals, the plurality of output signals being obtained from a plurality of devices to be managed and being obtained in a predetermined period;

a replacement step of replacing a selection result received by the reception module with a combination of the selection results in two output signals, the selection result being corresponding to the group, the two output signals being selected from the plurality of output

signals; and

a model generation step of generating a ranking model of the output signal based on the selection results after the replacement, wherein the model generation step further comprising:

setting an arrangement order of the plurality of output signals as an arrangement order of each of a row and a column,

generating a matrix in which selection results in two output signals obtained by the replacement module are used as values of components corresponding to ranks of the respective two output signals,

generating the ranking model by solving a problem of maximizing a value of an upper triangle including components above diagonal components of the matrix,

generating the ranking model by a heuristic method,

arranging the plurality of output signals in a predetermined arrangement order and changes a rank of an output signal of a processing target among the plurality of output signals in accordance with a predetermined condition to generate a plurality of arrangement orders,

obtaining a value of the upper triangle of the

matrix corresponding to each of the plurality of arrangement orders,

obtaining one of the plurality of arrangement orders as the ranking model based on the value of the upper triangle, and

fixing ranks of at least a part of output signals that have not been selected as a root cause to ranks lower than ranks of output signals that have been selected as a root cause and changes ranks of output signals that are not fixed.

8. A program causing a computer to function as:

a reception module configured to receive selection of an output signal corresponding to a root cause from a group including a plurality of output signals, the plurality of output signals being obtained from a plurality of devices to be managed and being obtained in a predetermined period;

a replacement module configured to replace a selection result received by the reception module with a combination of the selection results in two output signals, the selection result being corresponding to the group, the two output signals being selected from the plurality of output signals; and

a model generation module configured to generate a ranking model of the plurality of output signals based on

the selection results after the replacement, wherein the model generation module

sets an arrangement order of the plurality of output signals as an arrangement order of each of a row and a column,

generates a matrix in which selection results in two output signals obtained by the replacement module are used as values of components corresponding to ranks of the respective two output signals,

generates the ranking model by solving a problem of maximizing a value of an upper triangle including components above diagonal components of the matrix,

generates the ranking model by a heuristic method,

arranges the plurality of output signals in a predetermined arrangement order and changes a rank of an output signal of a processing target among the plurality of output signals in accordance with a predetermined condition to generate a plurality of arrangement orders,

obtains a value of the upper triangle of the matrix corresponding to each of the plurality of arrangement orders,

obtains one of the plurality of arrangement

orders as the ranking model based on the value of the upper triangle, and

fixes ranks of at least a part of output signals that have not been selected as a root cause to ranks lower than ranks of output signals that have been selected as a root cause and changes ranks of output signals that are not fixed.