CLAIMS

[Claim 1]

An apparatus comprising:

an acquisition means for acquiring cause-effect relationship data indicating a cause-effect relationship between a plurality of incidents that occur in a ship and indicating rules for estimating an index indicating a likelihood of occurrence of each of the plurality of the incidents in the future, and attribute value data indicating, for each of one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, an attribute value of the ship or an environment in which the ship is located, relating to an occurrence of the incident; and

an estimation means for estimating an index indicating a likelihood of occurrence in the future in accordance with the attribute value indicated by the attribute value data regarding each of one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, and for estimating an index indicating a likelihood of occurrence in the future in accordance with the rule indicating the cause-effect relationship data by the index estimating the incident serving as a cause of the incident regarding each of one or more incidents for which an incident serving as a cause is indicated by the cause-effect relationship data.

[Claim 2]

The apparatus comprising:

an acquisition means for acquiring cause-effect relationship data

indicating a cause-effect relationship between a plurality of incidents that occur in a ship, and attribute value data indicating, for each of one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, an attribute value of the ship or an environment in which the ship is located, relating to an occurrence of the incident; and

an estimation means for estimating a likelihood of occurrence of each of the plurality of incidents based on the cause-effect relationship data and the attribute value data, wherein

for each of the one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, the acquisition means acquires reference value data indicating a reference value of an attribute value of the ship or the environment in which the ship is located, relating to the incident, and

for each of the one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, the estimation means estimates the likelihood of occurrence of the incident based on the result of comparing an attribute value indicated by the attribute value data relating to the incident and a reference value indicated by the reference value data relating to the incident.

[Claim 3]

The apparatus comprising:

an acquisition means for acquiring cause-effect relationship data indicating a cause-effect relationship between a plurality of incidents that occur in a ship, and attribute value data indicating, for each of one or more incidents for which an incident serving as

a cause is not indicated by the cause-effect relationship data, an attribute value of the ship or an environment in which the ship is located, relating to an occurrence of the incident; and

an estimation means for estimating a likelihood of occurrence of each of the plurality of incidents based on the cause-effect relationship data and the attribute value data, wherein

for each of at least one of the one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, the acquisition means acquires the attribute value data indicating a plurality of attribute values of the ship or the environment in which the ship is located, relating to the incident,

for each of the at least one incident, the acquisition means acquires reference value data indicating a reference combination of a plurality of attribute values relating to the incident, and

for each of the at least one incident, the estimation means estimates the likelihood of occurrence of the incident based on the result of comparing the combination of the plurality of attribute values indicated by the attribute value data and the reference combination of the plurality of attribute values indicated by the reference value data.

[Claim 4]

The apparatus according to any one of claims 1 to 3, wherein

the cause-effect relationship data indicates a tree structure in which the plurality of incidents are nodes, and a contribution level according to which, in each node group in a parent-child relationship in the tree structure, the likelihood of occurrence of an incident of a child node included in the node group contributes to

the likelihood of occurrence of an incident of a parent node included in the node group, and

for each of one or more leaf nodes in the tree structure, the estimation means estimates the likelihood of occurrence of an incident of the leaf node based on the attribute value data relating to the incident of the leaf node, and estimates the likelihood of occurrence of an incident of an internal node in the tree structure in order from a leaf node side to a root node side based on the estimated likelihood of occurrence of the incident of the leaf node and the contribution level indicated by the cause-effect relationship data.

[Claim 5]

The apparatus according to any one of claims 1 to 4, comprising:

a notification means for performing processing for performing notification of the incident to a user if the likelihood of occurrence estimated by the estimation means exceeds a predetermined threshold value.

[Claim 6]

The apparatus according to claim 5, comprising:

a specifying means for specifying the incident that contributes the most to an increase in the likelihood of occurrence of an incident for which the likelihood of occurrence estimated by the estimation means exceeds a predetermined threshold value,

wherein the notification means performs processing for performing notification of the incident specified by the specifying means to the

user.

[Claim 7]

A program for causing a computer to execute:

processing for acquiring cause-effect relationship data indicating a cause-effect relationship between a plurality of incidents that occur in a ship and indicating rules for estimating an index indicating a likelihood of occurrence of each of the plurality of the incidents in the future, and attribute value data indicating, for each of one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, an attribute value of the ship or an environment in which the ship is located, relating to an occurrence of the incident; and

processing for estimating an index indicating a likelihood of occurrence in the future in accordance with the attribute value indicated by the attribute value data regarding each of one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, and for estimating an index indicating a likelihood of occurrence in the future in accordance with the rule indicating the cause-effect relationship data by the index estimating the incident serving as a cause of the incident regarding each of one or more incidents for which an incident serving as a cause is indicated by the cause-effect relationship data.

[Claim 8]

A program for causing a computer to execute:

processing for acquiring cause-effect relationship data indicating a

cause-effect relationship between a plurality of incidents that occur in a ship, and attribute value data indicating, for each of one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, an attribute value of the ship or an environment in which the ship is located, relating to an occurrence of the incident; and

processing for estimating a likelihood of occurrence of each of the plurality of incidents based on the cause-effect relationship data and the attribute value data, wherein

for each of the one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, the estimation means estimates the likelihood of occurrence of the incident based on the result of comparing an attribute value indicated by the attribute value data relating to the incident and a reference value indicated by the reference value data relating to the incident.

[Claim 9]

An apparatus comprising:

an acquisition means for acquiring cause-effect relationship data indicating a cause-effect relationship between a plurality of incidents that occur in a ship, and attribute value data indicating, for each of one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, an attribute value of the ship or an environment in which the ship is located, relating to an occurrence of the incident; and

an estimation means for estimating a likelihood of occurrence of each of the plurality of incidents based on the cause-effect

relationship data and the attribute value data, wherein

for each of the one or more incidents, the estimation means estimates the likelihood of occurrence of the incident based on the result of comparing the combination of the plurality of attribute values indicated by the attribute value data and the reference combination of the plurality of attribute values indicated by the reference value data.

[Claim 10]

A computer-readable storage medium permanently storing a program for causing a computer to execute:

processing for acquiring cause-effect relationship data indicating a cause-effect relationship between a plurality of incidents that occur in a ship and indicating rules for estimating an index indicating a likelihood of occurrence of each of the plurality of the incidents in the future, and attribute value data indicating, for each of one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, an attribute value of the ship or an environment in which the ship is located, relating to an occurrence of the incident; and

processing for estimating an index indicating a likelihood of occurrence in the future in accordance with the attribute value indicated by the attribute value data regarding each of one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, and for estimating an index indicating a likelihood of occurrence in the future in accordance with the rule indicating the cause-effect relationship data by the index estimating the incident serving as a cause of the incident

regarding each of one or more incidents for which an incident serving as a cause is indicated by the cause-effect relationship data.

[Claim 11]

A computer-readable storage medium permanently storing a program for causing a computer to execute:

processing for acquiring cause-effect relationship data indicating a cause-effect relationship between a plurality of incidents that occur in a ship, and attribute value data indicating, for each of one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, an attribute value of the ship or an environment in which the ship is located, relating to an occurrence of the incident; and

processing for estimating a likelihood of occurrence of each of the plurality of incidents based on the cause-effect relationship data and the attribute value data, wherein

for each of the one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, the estimation means estimates the likelihood of occurrence of the incident based on the result of comparing an attribute value indicated by the attribute value data relating to the incident and a reference value indicated by the reference value data relating to the incident.

[Claim 12]

A computer-readable storage medium permanently storing a program for causing a computer to execute:

an acquisition means for acquiring cause-effect relationship data indicating a cause-effect relationship between a plurality of incidents that occur in a ship, and attribute value data indicating, for each of one or more incidents for which an incident serving as a cause is not indicated by the cause-effect relationship data, an attribute value of the ship or an environment in which the ship is located, relating to an occurrence of the incident; and

an estimation means for estimating a likelihood of occurrence of each of the plurality of incidents based on the cause-effect relationship data and the attribute value data, wherein

for each of the one or more incidents, the estimation means estimates the likelihood of occurrence of the incident based on the result of comparing the combination of the plurality of attribute values indicated by the attribute value data and the reference combination of the plurality of attribute values indicated by the reference value data.