CLAIMS

[Claim 1]

A causal network generation system to generate a causal network representing a causal relationship between a plurality of events that occur to a target, the causal network generation system comprising:

a data acquisition unit that acquires time series data of each of a plurality of indexes used for quantitatively describing the plurality of events;

a causal relationship evaluation unit that evaluates, for each pair of two different indexes selected from the plurality of indexes, a causal relationship between the two indexes; and

an output unit that outputs data describing a causal relationship for each pair of the two indexes evaluated by the causal relationship evaluation unit,

the causal relationship evaluation unit assuming one of the two indexes as a cause index and the other as an effect index, and calculating transfer entropy that is strength of influence of a change in the cause index on a change in the effect index after a delay time s while varying a value of the delay time s to evaluate maximum transfer entropy between the cause index and the effect index and a delay time with which the transfer entropy between the cause index and the effect index becomes maximum, and

the causal relationship output from the output unit includes information of the delay time with which the transfer entropy between the cause index and the effect index becomes maximum and information of a maximum transfer entropy between the cause index and the effect index.

[Claim 2]

The causal network generation system according to claim 1,

wherein the causal relationship evaluation unit evaluates the transfer entropy between the cause index and the effect index for n delay times from first to n-th (where n is an integer greater than or equal to 2), and

the causal relationship output from the output unit includes information of n delay times from first to n-th and information of n transfer entropy corresponding to the respective first to n-th delay times.

[Claim 3]

A causal network generation system to generate a causal network representing a causal relationship between a plurality of events that occur to a target, the causal network generation system comprising:

a data acquisition unit that acquires time series data of each of a plurality of indexes used for quantitatively describing the plurality of events;

a causal relationship evaluation unit that evaluates, for each pair of two different indexes selected from the plurality of indexes, a causal relationship between the two indexes; and

an output unit that outputs data describing a causal relationship for each pair of the two indexes evaluated by the causal relationship evaluation unit,

the causal relationship evaluation unit assuming one of the two indexes as a cause index and the other as an effect index, and calculating transfer entropy that is strength of influence of a change in the cause index on a change in the effect index after a delay time s while varying a value of the delay time s to evaluate the transfer entropy between the cause index and the effect index for n delay times from first to n-th (where n is an integer greater than or equal to 2),

wherein the causal relationship output from the output unit includes information of n delay times from first to n-th and information of n transfer entropy corresponding to the respective first to n-th delay times.

[Claim 4]

The causal network generation system according to any one of claims 1 to 3,

wherein the causal relationship evaluation unit calculates a correlation coefficient between a value of the cause index and a value of the effect index after the delay time, and

the causal relationship output from the output unit includes information of the correlation coefficient.

[Claim 5]

A causal network generation system to generate a causal network representing a causal relationship between a plurality of events that occur to a target, the causal network generation system comprising:

a data acquisition unit that acquires time series data of each of a plurality of indexes used for quantitatively describing the plurality of events;

a causal relationship evaluation unit that evaluates, for each pair of two different indexes selected from the plurality of indexes, a causal relationship between the two indexes; and

an output unit that outputs data describing a causal relationship for each pair of the two indexes evaluated by the causal relationship evaluation unit,

the causal relationship evaluation unit assuming one of the two indexes as a cause index and the other as an effect index, calculating transfer entropy that is strength of influence of a change in the cause index on a change in the effect index after a delay time s while varying a value of the delay time s to evaluate the transfer entropy between the cause index and the effect index and a delay time for propagation of an influence of the cause index to the effect index, and calculating a correlation coefficient between a value of the cause index and a value of the effect index after the delay time,

wherein the causal relationship output from the output unit includes information of the correlation coefficient.