[CLAIMS]

[Claim 1]

A portfolio creation assistance device, comprising:

a storage unit storing information on each of financial commodities; and

a computation unit performing a computation of an Ising model of a predetermined expression in which items of an expected return rate, a price drop risk, and a market sensitivity in a portfolio including combined predetermined ones of the financial commodities indicated by the information are combined with weights for the respective items, wherein

the computation unit outputs portfolios each obtained for one of patterns of the weights for the respective items as a result of the computation to a predetermined device, the portfolios each minimizing a value of the predetermined expression,

wherein the portfolio creation assistance device is a CMOS annealing machine that solves a combinatorial optimization problem relating to the Ising model.

[Claim 2]

The portfolio creation assistance device according to claim 1, wherein

the computation unit further executes

processing of plotting a position of each of the portfolios based on values of the expected return rate, the price drop risk, and the market sensitivity in the portfolio concerned, on at least one plane from among a plane defined by two axes of the price drop risk and the expected return rate, a plane defined by two axes of the expected return rate and an interest delta as the market sensitivity, and a plane defined by two axes of the expected return rate and an exchange delta as the market sensitivity, drawing, on the at least one plane on which the plotting is performed, an efficient frontier curve

corresponding to the plane, and outputting the plane to a predetermined device.

[Claim 3]

The portfolio creation assistance device according to claim 2, wherein

the computation unit performs

predetermined highlighting processing on a portfolio out of the portfolios plotted on the plane defined by the two axes of the price drop risk and the expected return rate, the portfolio having a lower price drop risk and a higher expected return rate than those of a current portfolio of a predetermined user and being plotted on a region above the efficient frontier curve.

[Claim 4]

The portfolio creation assistance device according to claim 3, wherein

the computation unit further performs

processing of identifying a specific portfolio plotted on a region above the efficient frontier curve out of the portfolios plotted on the plane defined by the two axes of the price drop risk and the expected return rate and calculating a value of return on risk by dividing a value of the expected return rate by a value of the price drop risk in the specific portfolio, and processing of, for the specific portfolio, arranging an object having an attribute according to a magnitude of the value of return on risk on the plane defined by the two axes of the interest delta and the exchange delta and outputting the plane to the predetermined device.

[Claim 5]

The portfolio creation assistance device according to claim 1, wherein

during the computation, the computation unit further

executes

processing of normalizing the values of the respective items of the expected return rate, the price drop risk, and the market sensitivity of each of the financial commodities included in the portfolio indicated by the information such that each of the values falls within a predetermined defined range and setting the normalized values into the corresponding items in the predetermined expression.

[Claim 6]

The portfolio creation assistance device according to claim 1, wherein

the computation unit further executes

processing of applying buying and selling costs on which information is held in advance to financial commodities that make a difference between at least one of the portfolios and a current portfolio of a predetermined user to identify a cost required for portfolio change from the current portfolio and outputting information on the cost to the predetermined device.

[Claim 7]

A portfolio creation assistance method, wherein

an information processing device including a storage unit storing information on each of financial commodities performs:

performing a computation of an Ising model of a predetermined expression in which items of an expected return rate, a price drop risk, and a market sensitivity in a portfolio including combined predetermined ones of the financial commodities indicated by the information are combined with weights for the respective items; and

outputting portfolios each obtained for one of patterns of the weights for the respective items as a result of the computation to a predetermined device, the portfolios each minimizing a value of the predetermined expression,

wherein the information processing device is a CMOS annealing machine that solves a combinatorial optimization problem relating to the Ising model.

[Claim 8]

The portfolio creation assistance method according to claim 7, wherein

the information processing device further executes

processing of plotting a position of each of the portfolios based on values of the expected return rate, the price drop risk, and the market sensitivity in the portfolio concerned, on at least one plane from among a plane defined by two axes of the price drop risk and the expected return rate, a plane defined by two axes of the expected return rate and an interest delta as the market sensitivity, and a plane defined by two axes of the expected return rate and an exchange delta as the market sensitivity, drawing, on the at least one plane on which the plotting is performed, an efficient frontier curve corresponding to the plane, and outputting the plane to a predetermined device.

[Claim 9]

The portfolio creation assistance method according to claim 8, wherein

the information processing device performs

predetermined highlighting processing on a portfolio out of the portfolios plotted on the plane defined by the two axes of the price drop risk and the expected return rate, the portfolio having a lower price drop risk and a higher expected return rate than those of a current portfolio of a predetermined user and being plotted on a region above the efficient frontier curve.

[Claim 10]

The portfolio creation assistance method according to

claim 9, wherein

the information processing device further performs

processing of identifying a specific portfolio plotted on a region above the efficient frontier curve out of the portfolios plotted on the plane defined by the two axes of the price drop risk and the expected return rate and calculating a value of return on risk by dividing a value of the expected return rate by a value of the price drop risk in the specific portfolio, and processing of, for the specific portfolio, arranging an object having an attribute according to a magnitude of the value of return on risk on the plane defined by the two axes of the interest delta and the exchange delta and outputting the plane to the predetermined device.

[Claim 11]

The portfolio creation assistance method according to claim 7, wherein

during the computation, the information processing device further executes

processing of normalizing the values of the respective items of the expected return rate, the price drop risk, and the market sensitivity of each of the financial commodities included in the portfolio indicated by the information such that each of the values falls within a predetermined defined range and setting the normalized values into the corresponding items in the predetermined expression.

[Claim 12]

The portfolio creation assistance method according to claim 7, wherein

the information processing device further executes

processing of applying buying and selling costs on which information is held in advance to financial commodities that make a difference between at least one of the portfolios and a current portfolio of a predetermined user to identify a cost

required for portfolio change from the current portfolio and outputting information on the cost to the predetermined device.