WHAT IS CLAIMED IS:

1. A method comprising:

receiving a plurality of inputs including domain parameters and initial weights;

providing the plurality of inputs to an optimization model;

performing, using a first layer of the optimization model, a training and optimization process based on the plurality of inputs and based on a training objective;

performing, using a second layer of the optimization model, a differencing operation on an output of the first layer;

recording, using a third layer of the optimization model, a loss based on the training objective used by the optimization model;

calculating and storing, using a fourth layer of the optimization model, metrics regarding the training and optimization process; and

outputting, using the optimization model, updated weights.

2. The method of Claim 1, further comprising:

setting one or more hyperparameters of the optimization model, wherein the one or more hyperparameters include at least one of:

whether the first layer of the optimization model is a dense layer or a recurrent layer;

a number of hidden layers of the first layer of the optimization model;

a number of units per hidden layer of the first layer of the optimization model; and

a maximum number of epochs for the training objective.

3. The method of Claim 1, wherein performing, using the first layer of the optimization model, the training and optimization process includes performing model fitting based on the plurality of inputs to fit a neural network with backpropagation.

4. The method of Claim 3, wherein performing the model fitting includes:

adapting parameter learning rates in real time based on an average of first and second moments by calculating an exponential moving average of a gradient and a moving average of a squared gradient;

controlling decay rates of the exponential moving average of the gradient and the moving average of the squared gradient;

bias correcting one or more weight parameters; and

updating the initial weights using the bias corrected one or more weight parameters.

5. The method of Claim 1, wherein the plurality of inputs further includes final weight parameters, and wherein performing the training and optimization process includes performing a rebalancing process in which a path to achieve the final weight parameters is determined by the optimization model.

6. The method of Claim 1, wherein performing the training and optimization process includes performing a multi-period portfolio optimization, wherein the plurality of inputs includes returns data, risks data, volumes data, and the initial weights from a feeder model, and wherein the optimization model outputs multi-period weights for a defined time period.

7. The method of Claim 6, wherein the multi-period portfolio optimization maximizes returns for a given forecasting based on market impact predictions.

8. The method of Claim 6, further comprising performing at least one data consistency check on at least one input of the plurality of inputs, wherein the at least one data consistency check includes one or more of:

checking that projected returns and volumes are in a certain range;

checking that a variance-covariance matrix associated with the risks data is positive semidefinite;

checking that the variance-covariance matrix associated with the risks data is positive definite;

checking a consistency of a number of securities;

checking validity of the volumes data;

checking a feasibility of one or more constraints; and

performing a boundless check on the plurality of inputs.

9. An apparatus comprising:

at least one processor supporting optimization, wherein the at least one processor is configured to perform the method of any one of Claims 1 to 8.

10. A non-transitory computer readable medium containing instructions that support optimization and that when executed cause at least one processor to perform the method of any one of Claims 1 to 8.