

Claims

1. A logistic price prediction system comprising:

a processor, a memory and instructions stored on the memory and executable by the processor to:

receive an order;

pre-process the order to form a vector of length 174 relating to the order;

apply a neural network based on the vector to predict a price; and

train a model of the neural network comprises instruction to apply a loss function with the following expression,

$$L(y, f(X)) = \frac{1}{N} \left| \frac{f(X) - y}{y} \right| \cdot g(y, f(X))$$

$$g(y, f(X)) = \begin{cases} (f(X) - y)^2, & \text{if } f(X) - y \geq 0 \\ p \cdot (f(X) - y)^2, & \text{otherwise,} \end{cases}$$

where X is the data, f is the model used by the neural network, N is the total number of records in a training batch, y is the true prices collected from past orders, and p is the pre-configured penalty weight.

2. The logistic price prediction system according to claim 1 wherein the instruction to pre-process the order to form the vector of length 174 relating to the order comprises

instructions to:

obtain information about the order;

generate features based on the information; and

convert the order with the generated features to form the vector of length 174.

3. The logistic price prediction system according to claim 2 wherein the information about the order comprises truck model identification number, truck quantity, pick up

date/time, drop off date/time, boolean value indicating whether or not tax invoice is requested, boolean value indicating whether the shipper wants the whole truck or not, truck type identification number, weight of the cargo, length of the cargo, width of the cargo, height of the cargo, type of bidder, pick up area identification number, drop off area identification number, distance from the pick up point to the drop off point, duration from the pick up point to the drop off point, weight of the truck, and type of cargoes.

4. The logistic price prediction system according to claim 3 wherein the instruction to generate features based on the information comprises instructions to:

generate continuous features comprising: volume of truck based on the dimensions of input truck type identification number, volume of cargo based on the length, width, and height of the cargo, expected delivery speed based on pick up and drop off date/time;

in response to features that are not binary, construct one-hot vectors where an array has a single high bit for an index indicating correct class and low bits for others in the array.

5. The logistic price prediction system according to claim 1 wherein the instruction to apply the loss function further comprises instruction to minimizing $L(y, f(X))$.

6. A logistic price prediction method comprising:

receiving an order;

pre-processing the order to form a vector of length 174 relating to the order;

applying a neural network based on the vector to predict a price; and

training a model of the neural network comprises applying a loss function with the

following expression,

$$L(y, f(X)) = \frac{1}{N} \left| \frac{f(X) - y}{y} \right| \cdot g(y, f(X))$$

$$g(y, f(X)) = \begin{cases} (f(X) - y)^2, & \text{if } f(X) - y \geq 0 \\ p \cdot (f(X) - y)^2, & \text{otherwise,} \end{cases}$$

where X is the data, f is the model used by the neural network, N is the total number of records in a training batch, y is the true prices collected from past orders, and p is the pre-configured penalty weight.

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7. The logistic price prediction method according to claim 6 wherein the step of pre-processing the order to form the vector of length 174 relating to the order comprises:

obtaining information about the order;

generating features based on the information; and

10 converting the order with the generated features to form the vector of length 174.

8. The logistic price prediction method according to claim 7 wherein the information about the order comprises truck model identification number, truck quantity, pick up date/time, drop off date/time, boolean value indicating whether or not tax invoice is requested, boolean value indicating whether the shipper wants the whole truck or not, truck type identification number, weight of the cargo, length of the cargo, width of the cargo, height of the cargo, type of bidder, pick up area identification number, drop off area identification number, distance from the pick up point to the drop off point, duration from the pick up point to the drop off point, weight of the truck, and type of cargoes.

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9. The logistic price prediction method according to claim 8 wherein the step of generating features based on the information comprises instructions to:

generating continuous features comprising: volume of truck based on the dimensions of input truck type identification number, volume of cargo based on the length, width, and height of the cargo, expected delivery speed based on pick up and drop off date/time;

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in response to features that are not binary, constructing one-hot vectors where an array has a single high bit for an index indicating correct class and low bits for others in the array.

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11. The logistic price prediction method according to claim 6 wherein the step of applying the loss function comprises minimizing $L(y, f(X))$.