

CLAIMS

1. A computer-implemented method for training a fraudulent transaction detection model, the method comprising:

obtaining a classification sample set, wherein the classification sample set comprises a plurality of calibration samples, each calibration sample comprising a user operation sequence and a time sequence, wherein the user operation sequence comprises a predetermined quantity of user operations and the user operations are arranged in chronological order, and wherein the time sequence comprises a time interval between adjacent user operations in the user operation sequence (21);

for each calibration sample,

processing the calibration sample using the fraudulent transaction detection model, the fraudulent transaction detection model comprising a convolution layer and a classifier layer, the calibration sample being processed by performing operations comprising (52):

performing first convolution processing on the user operation sequence at the convolution layer to obtain first convolution data (22),

performing second convolution processing on the time sequence to obtain second convolution data (23), and

combining the first convolution data with the second convolution data, to obtain time adjustment convolution data (24), and

classifying the calibration sample by entering the time adjustment convolution data to the classifier layer, and

training the fraudulent transaction detection model based on a classification result of the classifier layer (25), wherein training the fraudulent transaction detection model comprises:

for each sample, determining a loss function by comparing the classification result obtained from the classifier layer for the sample with a calibration classification status of the sample to determine the loss function; and

iteratively performing a derivation on the classification loss function for a gradient transfer to modify a plurality of parameters in the fraudulent transaction detection model until the classification loss function is within a predetermined range.

30

2. The method according to claim 1, further comprising: processing the user operation sequence by using a one-hot encoding method or a word embedding model to obtain an operation matrix before performing the first convolution processing on the user operation

sequence.

3. The method according to claim 1, wherein performing second convolution processing on the time sequence, to obtain second convolution data comprises: successively processing a plurality of elements in the time sequence by using a convolution kernel of a predetermined length k, to obtain a time adjustment vector A serving as the second convolution data.

4. The method according to claim 3, wherein a dimension of the time adjustment vector A is corresponding to a dimension of the first convolution data.

5. The method according to claim 3, wherein obtaining the time adjustment vector A serving as the second convolution data comprises: obtaining a vector element a_i in the time adjustment vector A by using the following formula:

$$a_i = f\left(-\sum_{j=1}^k x_{i+j} * C_j\right), \text{ wherein}$$

f is a transformation function, x_i is an i^{th} element in the time sequence, and C_j is a parameter associated with the convolution kernel.

6. The method according to claim 5, wherein the transformation function f is one of a tanh function, an exponential function, and a sigmoid function.

7. The method according to claim 1, wherein combining the first convolution data with the second convolution data comprises: performing point multiplication combining on a matrix corresponding to the first convolution data and a vector corresponding to the second convolution data.

8. The method according to claim 1, wherein the convolution layer comprises a plurality of convolution layers.

9. The method according to claim 8, further comprising: using time adjustment convolution data obtained at a previous convolution layer as a user operation sequence of a next convolution layer for processing, and outputting time adjustment convolution data obtained at the last convolution layer to the classifier layer.

10. The method according to any one of claims 1 to 9, wherein the fraudulent transaction detection model comprises a convolutional neural network (CNN) algorithm model.

11. An apparatus for training a fraudulent transaction detection model, the apparatus comprising a plurality of modules configured to perform the method of any one of claims 1 to 10.