Software engineering implementation and e-commerce model design based on neural digestive system monitoring and rapid prediction of amylase

Pei Fan [1, a], Yezhi Yuan [2, b], Jie Zhang [3, c], Yuting Huang [4, d], Xiaobo Wu [5, e], Liangyu Li [6, f], Yi Qin [7, *]

[1] Professional degree of Finance, School of Economics, Tianjin University of Commerce, Tianjin, China

[2] School of economics, BelarusianStateUniversity, Minsk Belarus

[3] Financial Management, School of Business, Master, Belarusian State University, Minsk, Belarus

[4] Financial Management, School of Business, Belarusian State University, Belarus

[5] RUDN University, Peoples Friendship University of Russia, Miklukho Maklay Str 6, Moscow 117198, Russia

[6] Financial Management, School of Business, Belarusian State University, Misnk, Belarus

[7] Cancer hospital of Chifeng city, Tumor institute, Chifeng university. Chifeng, China

* Corresponding Author Email: qinyimedicine001@163.com, [a]2908048276@qq.com, [b]yuanyezhiknight@foxmail.com, [c]40916535@qq.com, [d]625801573@qq.com, [e]1032228164@rudn.ru, [f]liangyuli00823@gmail.com

Abstract. Convolutional neural networks can be used to predict amylase levels in patients with acute abdomen. Based on this algorithm, we can reduce the error rate in hospital emergency work. As a biomedical engineering study, this study processed a series of continuous data such as patient age, symptoms, pain index, and life risk exposure factors. This software project has the ability to perform regression analysis based on the above characteristics, it can be used to determine whether the blood amylase level is normal, which provides assistance in the clinical diagnosis of pancreatitis, a disease that directly affects the 24-hour survival of patients. We believe that this software engineering can serve as a purchasing option for e-commerce systems and propose a solution for this situation.

Keywords: Neural network, Computer, Pharmacology, E-commerce, Data, Device.

1. Introduction

Convolutional neural networks are a new type of unsupervised learning algorithm that has made significant progress in recent years. Its main idea is to use inter layer node competition to generate hidden functions for processing nonlinear systems. In terms of processing non-stationary signals, its advantages mainly lie in the ability to utilize all hidden layers in the network to maintain a certain relationship between the original data and the newly generated parameters, thereby achieving nonlinear function approximation; Reduce the high requirements of algorithm time and computational complexity for output vectors by using simple and effective methods. Pancreatitis is characterized by acute upper abdominal pain and an increase in amylase and lipase in urine and blood. Laboratory tests show an increasing trend in amylase levels in blood and urine. Pancreatitis is further divided into chronic and acute types. Acute pancreatitis is an acute inflammation caused by the pancreas and surrounding tissues, with clinical manifestations such as necrosis, edema, and bleeding, commonly seen in middle-aged male populations. However, in emergency medicine, it is difficult to complete laboratory returns and laboratory tests for this digestive disease within 5 minutes of discovering the patient, and clinical doctors mostly rely on experience to make judgments, resulting in a large number of misdiagnoses. In order to change this situation, we have built a neural network, achieved tool

support for clinical doctors, and also explored the commercialization of this tool, Explored the mechanism of engineering innovation in e-commerce.

2. Results

2.1. Use Matlab to train CNN

The structure of the convolutional neural network we designed is shown in Figure 1, and the parameter details are as follows, the activation parameter for the input end is 13x1x1, and the input data type is a txt file. The activation parameter for the input end is 13x1x1, and the input data type is a txt file. The parameters of Conv are 16x3x3x1, with a step size of 1, 1, and padding of 1, 1, 1, 1.

Figure 1. Model of CNN

The activation function is Relu and no pooling layer is set.

2.2. The data situation of neural networks

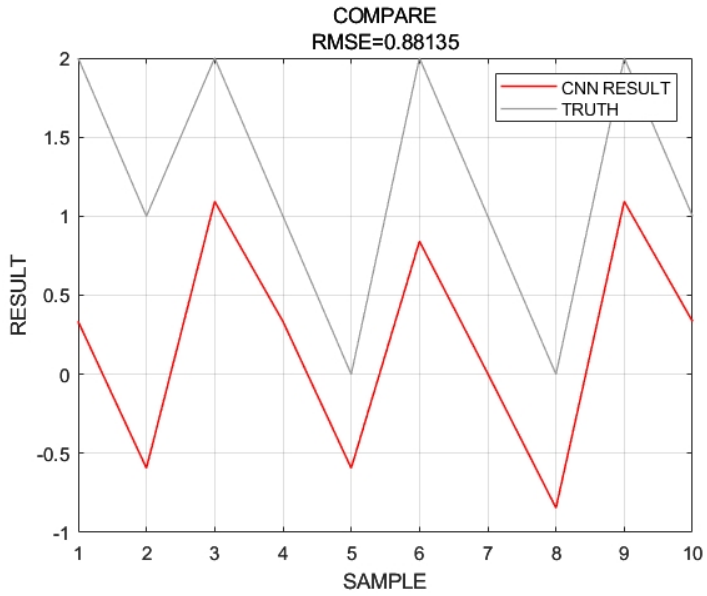

Figure 2. The RMSE result of compare of training group

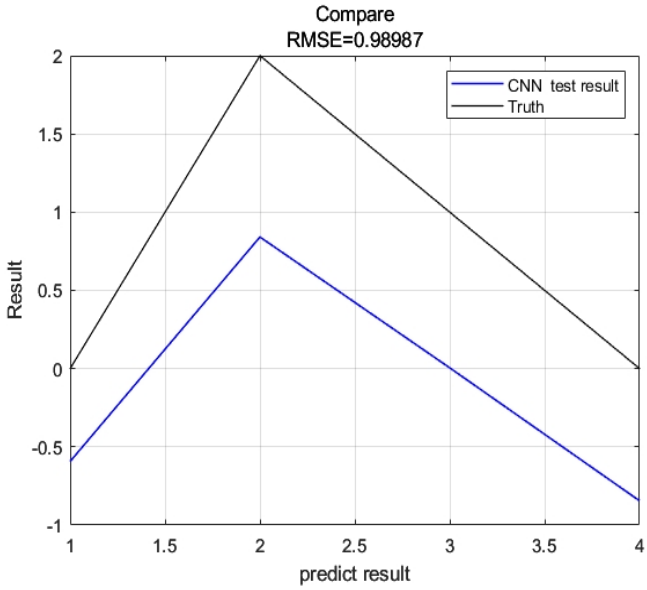

Figure 3. The RMSE result of compare of testing group

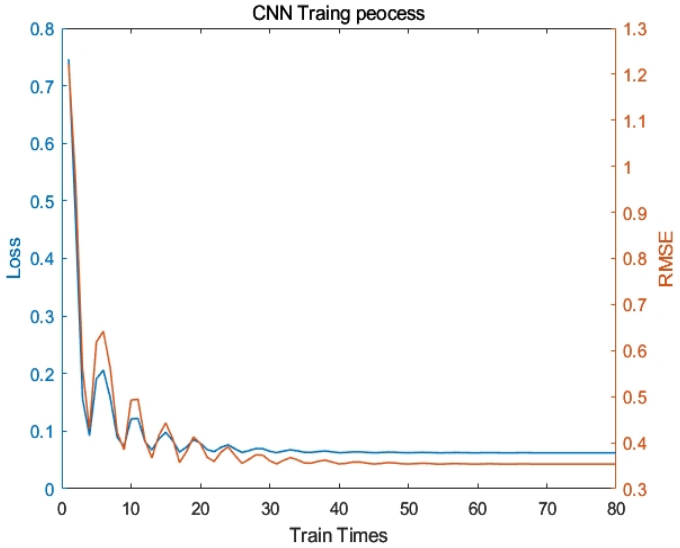

Figure 4. The process of training CNN

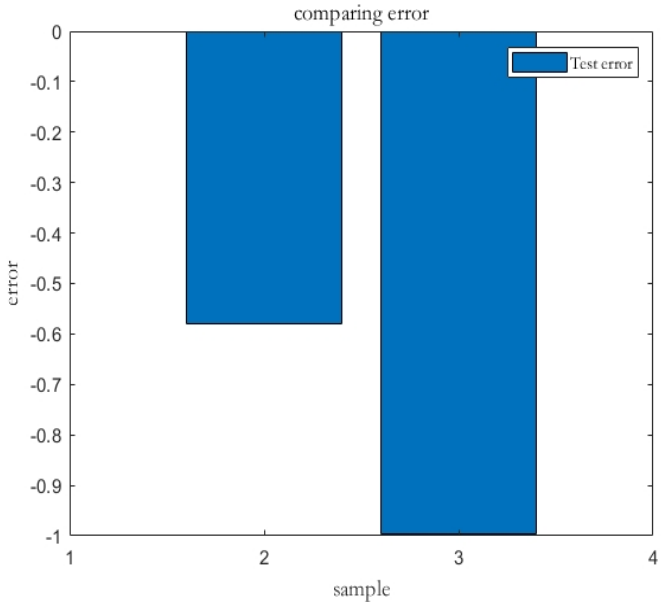

Figure 5. Relative error between several datasets

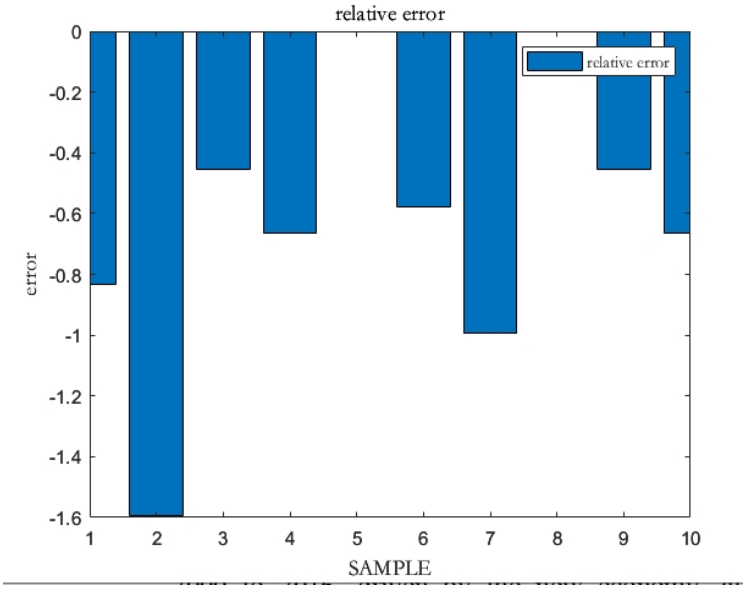

Figure 6. Classification error between multiple datasets

As shown in Figures 2-6, we demonstrate the different characteristics of this convolutional neural network, including the differences between loss values and prediction structures. At the same time, we use MATLAB to visualize the training process, and our work in this stage is to verify the feasibility of the algorithm.

2.3. The data situation of neural networks and the Returns of Matlab and the Explanation of Algorithms

Copy_ Of_ ScriptRegCNNs (name of algorithm package)
6 with the following layers × 1 Layer array:
1, Image Input 13 × one × 1 Image: 'zerocenter' normalization
2, 2D Convolutional 16 3 × 3 convolutions: stride [1 1], padding [1 1 1 1 1]
3, Batch Normalization Batch Normalization
4, ReLU
5, fully connected 1 fully connected layer
6, regression output mean squared error
Output size of each layer network:
Layer 1 (nnet. cnn. layer. ImageInputLayer): Output size= [13 1 1]
Layer 2 (nnet. cnn. layer. Convolution2DLayer): Output size= [13 1 16]
Layer 3 (nnet. cnn. layer. BatchNormalizationLayer): Output size= [13 1 16]
Layer 4 (nett. cnn. layer. ReLULayer): Output size= [13 1 16]
Layer 5 (nett. cnn. layer. FullyConnectiedLayer): Output size= [11 1]
Layer 6 (nett. cnn. layer. Regression OutputLayer): Output size= [11 1]
The MAE of the training set data is 0.99968
The MSE of the training set data is 1.1244
The MAPE of the training set data is: Inf
The RMSE of the training set data is 1.0604
The R of the training set data is 0.88135
The MAE of the test set data is 0.89807
The MSE of the test set data is 0.8498
The MAPE of the test set data is: Inf
The RMSE of the test set data is 0.92184
The R of the test set data is 0.98987

3. Model design

Thirteen Feature Selection Based on Clinical Medical Work is as follows.

3.1. The following are the input and output data of our convolutional network, built around the core of clinical medicine

1. Age
2. Gender
3. Eating habits
4. Drinking frequency
5. Weight
6. Height
7. Whether there is diabetes
8. Does it have fatty liver
9. Is there hypertension
10. Pain duration
11. Pain score
12. Pain location
13. Pain fluctuations

The output is three data points. If it is a continuous non integer, it is identified at a higher level. For example, it is divided into three danger levels: 1, 2, and 3. The output is 2.2, which is identified as the third level and high-risk level.

```
method=@mapminmax;
XMap=method ('apply', dataX, inputps);
XTestMapD =reshape (XMap, [size (XMap, 1), 1, 1, length (XMap)]);
YPred = predict (net, XTestMapD);
foreData=double (method ('reverse', double (YPred'), outputps));
```

After algorithm training, we can use this code to predict specific data. These three levels are determined based on the qualitative analysis of amylase, because the laboratory of Chifeng Cancer Hospital cannot provide quantitative data and can only determine whether it is abnormal. Therefore, our three levels also correspond to the results of laboratory tests for patients with corresponding conditions. The amylase is normal, with abnormalities and significant abnormalities.

4. E-commerce System design

(1) After algorithm training, we can use this code to predict specific data
(2) Lowering the user's usage threshold is very necessary for popularization
(3) Currently, we should expand the data capacity and improve the accuracy of neural networks.

The research team believes that these three requirements must be met in order to successfully commercialize e-commerce, and only after commercialization can algorithms truly obtain resources and continuously improve their performance.

5. Discussion

Due to the limited scientific research conditions of Chifeng Cancer Hospital, only 15 data points were selected. However, we believe that we should communicate with international peers and strive for other colleagues to cooperate with us after seeing this paper. We have verified the feasibility and clinical significance of the algorithm, and we urgently need more research institutions to participate in our project and provide data.

In clinical medicine, doctors need to diagnose patients and determine treatment plans based on test results. The importance of the test results is self-evident. In today's world, with the continuous development of medical technology, laboratory medicine is also constantly innovating, and the

modern medical model is undergoing a transformation, constantly improving the modernization level of testing. Therefore, the accuracy of test results has also been greatly improved. However, in clinical practice, there are still factors that affect the accuracy of test results due to clinical collection and organization. The process of conducting inspections and issuing reports in the laboratory involves multiple stages such as sample reception, sampling, sample preparation, inspection, data entry, review, issuance, and printing of reports. The process of inspecting and issuing reports involves both the use of equipment and personnel operations, as well as complex physical and chemical processes; There are both environmental and methodological requirements; There is both the circulation of goods and the transmission of data. Human, machine, material, method, and environment are the five major factors that affect inspection data and results. Every deviation from each link and influencing factor will have a certain degree of impact on the authenticity, scientificity, and impartiality of the test data. Therefore, this is also our main opinion in communicating with international peers, and our cooperation needs to be established under the condition of accurate data.

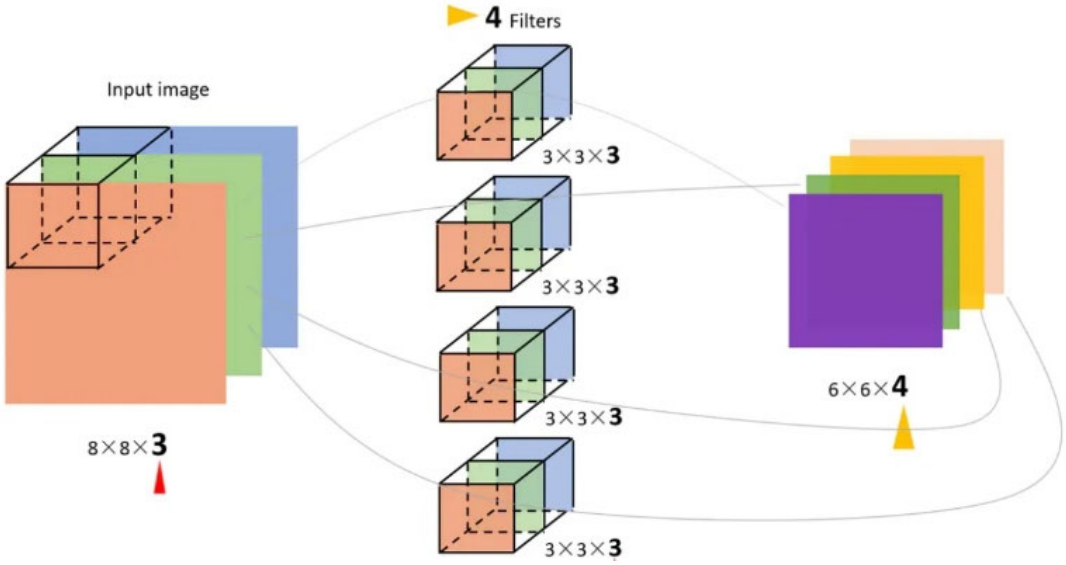

Figure 7. The foundation mechanism of CNN

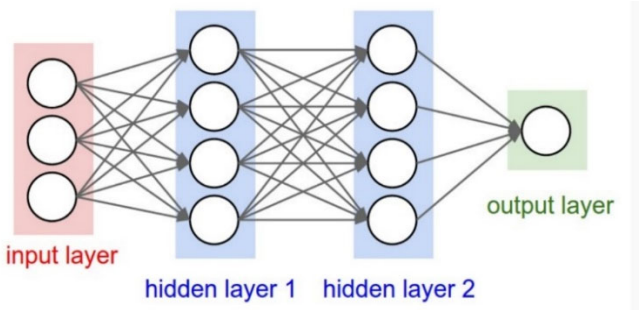

Figure 8. The foundation mechanism of FNN

As shown in Figures 7 and 8, we also believe that the FNN classification prediction neural network can be applied. However, the disadvantage of FNN is that it cannot predict continuous classification variables, so it may have insufficient sensitivity to clinical situations. However, with a large amount of data available, we believe that FNN can be more easily used, and therefore, both are future development directions.

6. Conclusion

The research team validated the feasibility of the algorithm using small-scale data and designed the algorithm in detail. The results were obtained through MATLAB, which verified the qualitative analysis of amylase determination using general data. However, currently limited by the amount of

data, clinical applications cannot be carried out. Based on preliminary experiments, we call on more colleagues from around the world to participate in our research, provide necessary data, optimize neural network parameters, and complete capital operations.

Acknowledgment

Praise Chifeng Cancer Hospital for providing the data, This paper did not involve human operations or other,experiments, only statistical analysis. It was completed under self funded research and has passed the ethical review of Chifeng Cancer Hospital.Data can ask for Qin Yi.

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