

Research on Prediction Method of Endocrine Diseases Based on DBN

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[Abstract] In the continuous development of computer technology, the medical field began to apply this technology when it predicted disease, and promoted the good development of the medical industry. In recent years, the latest in machine learning research is Deep Belief Nets (DBN). Therefore, this paper analyzes the methods for predicting endocrine diseases on the basis of DBN.

[Keywords] DBN; Endocrine disease; Prediction Method

1. Introduction

In the context of gradually rising economic levels, people's material life is greatly satisfied, which has prompted people to pay more and more attention to physical health. At present, one of the hotspots of major portals is "healthy", and "physical health" has become one of the hot topics of various social platforms. The number of smart health management devices and apps about physical health is increasing. Endocrine diseases have a relatively high incidence in China. Although there are already advanced treatments and programs, some endocrine diseases such as diabetes can still be cured. It can only control the progress of the disease and pose a serious threat to people's health. Therefore, appropriate technical measures should be taken to predict the occurrence of endocrine diseases, prevent as early as possible, and reduce the incidence of endocrine diseases.

2. DBN-based Endocrine Disease Prediction Method

2.1 Establish a Predictive Model

Based on DBN, when constructing an endocrine disease prediction model, follow the following process:

Firstly, data collection and pre-processing, when the original data set is collected, the physical examination data of the endocrine disease patients are taken as the source, and then the collected data is preprocessed. Finally, the data set is divided into two parts, one is training data and the other is test data;

Secondly, the DBN model of endocrine diseases is constructed. The optimal network structure is carried out by experimental methods. Three aspects need to be identified, namely, the number of input layer nodes, the number of hidden layer nodes, and the number of hidden layers.

Thirdly, construct an endocrine disease prediction model and train the prediction model through training data. The error between the actual and target output is calculated, so as to speed up the training. The error is represented by a function related to the network weight W , and the weight matrix is adjusted by the conjugate gradient algorithm, and the obtained network weight matrix W is when the error function is at a minimum value;

Fourth, in the test phase, input test data into the prediction model to obtain a prediction result;

Fifth, the prediction results are analyzed. When the training data is the same as the test data, the prediction is performed using the classical prediction method, and the prediction results are compared with the endocrine disease DBN model.^[1]

In the process of constructing the DBN-based endocrine disease prediction model, the values of the attributes in the data set used do not have the same physical meaning and order of magnitude, so the data should be normalized. In this paper, when normalizing the selected data set, the Z-score standardization method is adopted. The normalization of this method is based on the mean and standard deviation of the original data set. After processing, when the data set is consistent with the normal distribution, the mean value is 0 and the standard deviation is 1.

2.2 Verify the Prediction Results of the Predictive Model

In the experiment, the data set used is the training data set to determine the optimal structure of the model DBN. When the number of input layer nodes changes from 1-10, the number of hidden layer nodes has five, which are 4, 8, 12, 16, and 20, respectively.

Then, the number of each input layer node and the hidden layer node is combined, and the average value of the recognition rate is calculated. According to the calculation results, when the number of input layer nodes is 6, the average of the recognition rate is the highest, and the number of hidden layer nodes is 16, the recognition rate is the highest.

In the test process of this paper, the hidden layer of the DBN model is 2 layers, and the number of input layer nodes is 6. The number of the first hidden layer nodes is 16 and the number of the second hidden layer nodes is not fixed. The selection range is 3-20. The experimental results show that when there are 8 hidden nodes, the highest recognition rate occurs, so 8 is set as the second layer implicit node combination.

3. The Design of Endocrine Disease Prediction System

After the above-mentioned DBN-based endocrine disease prediction model is established, based on this model, the prediction system is designed based on actual needs. When designing the system, Windows 7 Ultimate is used as the operating system, and the development platform selects Visual Studio 2012 and uses C# & C++ language development.

3.1 System Framework

The endocrine disease prediction system mainly relies on the data collected in daily life to predict the disease, and displays the data to people, so that people can prevent it in advance and reduce the incidence of endocrine diseases. According to the above requirements, the endocrine disease prediction system designed in this paper consists of three parts:

The first part is the data preprocessing module. After collecting the data related to endocrine diseases, the data is normalized and preprocessed;

The second part is the endocrine disease prediction module. After the pre-processing is completed, the data is imported into the DBN model, the endocrine disease model is established, and the training model is established. After completion, the body test data is input and predicted;

The third part is the result display module, which is used to display the prediction results to people.^[2]

3.2 System Module Design

3.2.1 The Data Preprocessing Module

When pre-processing the data, first select the attributes of the endocrine disease dataset. In the dataset, the values related to the physiological data of the human body are represented, and one piece of data is used as the interval of each name attribute. Filter out the required attribute values, complete the data attribute selection, and then store the processed data in a new data file.

Then, the data should be normalized. The normalization method still adopts the Z-score standardization method mentioned above. After the attribute selection processing file is imported, it is processed according to the method, and is saved in the specified path after completion.

3.2.2 Endocrine Disease Prediction Module

The module mainly works in two aspects. On the one hand, in the process of establishing a data model of endocrine diseases, in the process of constructing a DBN model, since the optimal structure has been determined above, we only need to input the numbers into the corresponding boxes. That is, the number of input layer nodes is 6, the number of the first hidden layer nodes is 16, and the number of the second hidden layer nodes is 8. After input, click to start modeling, and the model is established.

Since the DBN model has a relatively slow learning speed, in order to speed up its speed, a combination with a conjugate gradient speed algorithm is used; on the other hand, user data can be imported by predicting input user data.

3.2.3 Result Display Module

After the user data file is imported, click on the forecast and wait for the prediction result to be displayed.

4. Conclusion

Based on DBN, this paper analyzes the methods for predicting endocrine diseases and designs an endocrine disease prediction system. The results show that the probability of endocrine diseases in patients is well predicted, which will help users to make scientific prevention early, reduce the occurrence of endocrine diseases, and improve the health of the body.

References

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