Chapter 67
Using Functional Link Artificial Neural Network (FLANN) for Bank Credit Risk Assessment

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ABSTRACT

Credit scoring is the most important and critical component conducted by the credit providers to decide whether to grant a loan to the applicant or not. Therefore credit scoring models are generally used to predict the potentiality of the loan applicant. A proper evaluation of the credit can help the service provider to determine whether to grant or to reject the credit. The objective of the study is to predict banking credit scoring assessment using a data mining technique i.e. Functional Link Artificial Neural Network (FLANN) classifier. Credit approval datasets: Australian credit and German credit have been used to do this analysis. The output of the study shows that the proposed model used for classification works better on credit dataset. Secondly, we have applied our proposed model on the two credit approval dataset to check the performance of the model for the classification accuracy. A proper evaluation of the credit using the proposed FLANN approach can help the service provider to accurately and quickly ascertain whether to grant credit or to reject.

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INTRODUCTION

Classification technique is one the most difficult and complex task in the decision making process of human activity in business context. In the process of classification, a training set comprising of set of records can be generated, where each records of the training set consists of several attributes to provide the information about the record. Attributes, in general could be either continuous with reference to ordered domain or categorical with reference to unordered domain. One class attribute included in the feature set specifically maps the records to the class it belongs. The objective of any classification related problem is to develop a model to classify feature (class) depending upon the remaining features of the record. Recently there have been several studies that focus on the complex task of classifying for prediction purpose. Several models have already been developed and proposed over the years. Majority of the models proposed fall into the following categories: statistical models, genetic models, neural networks and decision trees. Traditional methods to solve the classification problems aren't suitable given that in a classification problem, determining the optimal nonlinear boundary is a complicated task. Therefore, Artificial Neural Networks (ANNs) having non-linear learning capabilities could be utilized for solving many complex applications. However, there have been very limited studies from literatures available that utilize neural networks especially functional link artificial neural network (FLANN) for the purpose of classification in data mining.

Artificial Neural Networks (ANNs) are a set of powerful tools for its nonlinear learning capability. This tool is applied for the complex applications like functional approximation, unsupervised classification and optimization, identifying and controlling a nonlinear system. For solving the classification problem FLANN usually takes less time to optimize the weight vector than the traditional algorithms. In traditional algorithm the complexity increases as the no of layers of the neural network increases. Pao et al. (2008) is one of the first few studies that proposed the FLANN structure and have shown that, the structure can be used for functional approximation and pattern classification with a low computational load and with a faster convergence rate than the MLP (Multilayer perceptron) structure. The need of hidden layer is removed in this network structure so the learning algorithm used in this structure becomes very simple. The dimensionality of the input vector increases in the functional expansion and the output generated by the FLANN structure provide a better discrimination capability in the input pattern. Neural networks works better not only for classifying patterns but also for approximating complex nonlinear process dynamics. This model is a good candidate model for the nonlinear processes and exhibits some intelligent behaviour towards the nonlinearity processes. MLP, RBF (Radial basis function) and SVM (Support vector machine) are some of the popular types of NN Model widely reported in literature. It is found that these models reportedly perform well with improved prediction competency but with a greater computational cost. As, these models have hidden layers in their neural network it will predict with high computational cost. Structures like, PPN (polynomial perceptron network) and also the FLANN must be considered so as to decrease the computational cost of neural networks. In this paper we considered FLANN structure with three different polynomials. To train the network, we have used the back propagation (BP) algorithm.