Decision Tree Combined with Neural Networks for Financial Forecast

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In this article I would like to introduce a hybrid adaptive method. There is high variety of methods for financial forecasts. This method is focusing for the financial default forecast in economics, but this method can be used generally for other financial forecasts as well, for example calculating value at risk.

This hybrid method combines two classical adaptive methods, which are the decision trees and the artificial neural networks. Many international articles were published all over the world about combining the two methods, but the speciality of this method which I would like to introduce is that this method uses the special issues of default forecasting in economics. The special knowledge is used as complementary heuristics in the hybrid model. The additional knowledge does not belong to the integral part of the model that is why the built model can be adapted easily for solutions of other problems. Of course in this case it is useful to build the given problem's speciality into the model. It is required from all well-chosen and well-sophisticated heuristics that the problem should be solved in an optimal way. This means that either higher accuracy and/or faster running time are expected.

In the article I would like to introduce the basics of decision trees and neural networks. These well-known structures can be definitely well applied in case of classification and forecast problems. In this article I will show a new model which is made by the combination of this two methods. In the beginning I will shortly introduce the well known perceptron and the multi layer perceptron model of neural networks and the ID3 algorithm which is used by decision trees. I will show the special points which are needed for the combination and I will show the classical combination form of these methods. In this part I would like to give a short outlook for the published articles from this area. After this part I would like to introduce in details the used hybrid method. I will show the new method's abstract model and the problems which occurred during building of the new model and the solution for it, for example I will show the case of over-teaching and the treatment of the continuous valued attributes. In order to solve the problems I used on the one hand the classical methods which can be found in the literature, on the other hand I established own methods using the problem's specialities and with this the problem could be solved.

The new $neural - tree$ method was built by using and testing of real company data. The results were compared to the results of a well-known and world-wide used economical default forecasting model. This method is the discriminance analysis. During the introduction of the results I would like to shortly summarize the basics of the discriminance analysis. For the testing it is necessary to introduce the discriminance analysis model. Without introducing all the details I will show the main steps of the model. The comparison of the models is made by using data from 2009.

I will show the results of the models in details in table form. Every measurement is done more times and by leaving out of the measurements the best and the worst results, I calculated the average of residual values which are published in this article. Analysing the results I will show the classification accuracy of the new method.

At the end of the article I will summarize the model's advantages and disadvantages and the barriers of the model. I will show the reasons of the classification accuracy of the results and explain the barriers. I will show the development possibilities of the model and the further research opportunities and questions in a schematic way.

References

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