In addition instead of using deterministic rules genetic algorithms uses probabil...

Business, Company

\n[toc title="Table of Contents"]\n

\n \t

\n[/toc]\n \n

Analysis of various models used in predicting Bankruptcy

Bankruptcy refers to a legal position of an individual or an organization becoming insolvent. This means that the individual or the organization becomes unable to pay its creditors. In many countries, the status of an individual or organization being bankrupt is usually declared by a court of law (Newton, 2010). The process starts with a creditor or the entity in question filing a bankruptcy petition in a court of law. The assets of the debtor are assessed and then used to pay a part of the creditors' debts. After the process, the debtor is usually relieved of the financial obligations of the debts incurred prior to that. The individual or organization becomes free to venture into business operations again, but after complying with certain regulations in place.

Over time, many models have been developed to enable a close-to accurate prediction of bankruptcy. Most of these models are used by majority of stakeholders in the corporate world to make major decisions. Given that the models are different from each other, they also have different levels of accuracy and success. While some of them are very common with industry players, others are little known and not widely used. The subject of this paper is to look at the different models available and analyze them. Information on where they come from, how they work, the degree of success, their strengths and weaknesses and factors impacting on their effectiveness will be covered.

Example of models that will be analyzed include: the Multiple discriminant analysis (MDA), Multivariate Adaptive Regression Splines (MARS), Genetic Algorithms, Artificial Neural Networks, and Cash Base reasoning among others.

Multiple Discriminant Analysis (MDA)

This is a statistical method which works by categorizing an observation into one of many categories. These categories are determined by characteristics of each of the observations. The history of the MDA technique dates back to the 1930’s, when it was first used. Prior to its establishment, the regression analysis was the most popular. Initially, the technique was majorly applied in behavioral and biological sciences. However, it gained momentum with continued use, and became applicable in many other disciplines. In the recent times, this method has been used with considerable success in the analysis of financial problems. Example of this is its application in the

evaluation of consumers' credit. In analysis of corporations, certain criterion is used to put the corporations into groups. Certain discriminant coefficients are used to classify them into mutually exclusive groups.

The MDA has various strengths which have led to its success. First of all, the technique takes into consideration all of the characteristics common among firms being evaluated. This is unlike other models which consider only selected characteristics. Again, MDA analyzes all the characteristics of the entities that are being considered simultaneously. Other methods are disadvantaged in that they do the classification in a sequential way. The method is also simple to use and it lacks substantial complexity.

On the other hand, MDA is considered to be inconsistent. The reason for this is that given the two types of discriminant analysis, that is, Mahalanobi's and Fisher's discriminant analysis, the result may not be similar. This leads to problems as it is not clear which of the two to use. The method is also considered complex by those with low arithmetic training.

Genetic Algorithm

The use of this model is inspired by the principle of survival for the fittest enumerated in the evolution process. This model highly resembles the natural evolution principle, which was developed by Charles Darwin. The model is heuristic in nature and is used to search for problems as well as to generate solutions. Techniques such as mutation, inheritance, selection and crossover, all of which relate to the natural selection process are applied.

This method does not directly deal with the parameters relating to the problem being solved. Rather, it works with codes representing the problem, which then produce codes representing the solution.

Though this model is not very popular, studies have shown that it has a considerable level of accuracy. For this reason, the model has a relatively high level of success in its application. This success has been brought about by the models' strengths. Some of the model's strengths include:

Genetic algorithms are able to analyze discrete and continuous functions. This is as opposed to other models which can only optimize either discrete or continuous functions or combinations.

The speed at which optimization can be carried out using this model is high. This is because Genetic Algorithms can be used on several computers concurrently.

The model however has a few weaknesses associated with its use. One of them is that this model presents some challenges in encoding information. This reduces its applicability. The model is also computationally expensive and does not guarantee optimality.

Artificial Neural Networks (ANN)

This is yet another method used to predict the possibility of corporate bankruptcy. This system uses a method similar to that of intelligent human beings. The classification according to this model is based on the financial health of a firm (Bernhardsen, 2005). Just as a logical human being would

decide whether a certain situation is okay or not, it is in the same manner that this system works. After evaluating the financial position of a firm, one is able to decide whether the firm is likely to slump into bankruptcy or not.

The origin of this model can be dated back in the year 1950. The main inspiration behind the invention of the Networks model was the belief scientists had about the functioning of the brain. There was an initial challenge on the use and application of this model due to lack of appropriate training methods. However, this changed at around mid-1980 when the back propagation algorithm was invented. In applying them to predict bankruptcy, information is collected and processed by the ‘ nodes’. It is this information that is used to predict the chances of failure.

The Artificial Neural Networks have been considered as one of the best models in use. They have achieved a considerable level of success and are as well expected to become more popular with continual advancements in technology.

The main advantages of this model are that large information can be handled at one time with fairly good results. The model can also be used to analyze complicated information. Again, the Artificial Neuron Network model can be used for both continuous as well as discrete data. On the other hand, this model is one of the hardest to understand. It requires advanced training to be able to use it well. In addition to that, the model offers no explanation for the results generated. This may make the results to be useless if no mechanisms are available for interpretation. Lastly, in spite of being an

expensive model, the solution generated may be of a low quality. This may not facilitate informed decision making.

Case-based Reasoning (CBR)

This model is closely related to the Artificial Neuron Networks. It was devised to overcome the limitations of the ANN model. For this reason, the model is used as an appropriate alternative of the ANN model.

In its application in predicting bankruptcy, the model uses knowledge and information of previous cases. It uses the specific details of previously experienced scenarios to model the effect of prevailing circumstances. When analysts want to determine the future of a certain entity, they first study the prevailing circumstance around the firm. They then identify any previous occurrence with similar details. What happened in the previous scenario is used to model the most likely outcome of the present situation. In a nutshell, the model uses old knowledge and solutions to provide solutions to current problems.

The process of prediction using this model follows four steps. The first and the most important step is that of retrieval. This involves matching details of a present problem with those of a previously solved one. It involves identifying the most similar case with the one at hand using specific retrieval methods. Details of the solved case are then re-used to try and solve the present case. Revision is done so as to allow details of the two cases to fit into each other. On solving the present case, the details are retained so as to be used in the future.

One of the main advantages of this model is its ability to fully offer explanatory information for its results. This is unlike the ANN model. The information used by this model is also up to date as the details on solved cases are usually automatically retained for future use. The main weakness with this model is its lower prediction accuracy. The solution offered by this model may not exactly mirror what will actually happen in the future. For this reason, this model has neither attracted much research nor has it achieved considerable success.

Multivariate Adaptive Regression Splines (MARS)

This method of predicting bankruptcy was developed in the year 1991 by Friedman. It is used to solve high dimensional cases especially where there are numerous explanatory variables. This tool, which uses statistics, has a wide applicability in many fields such as technology, science and finance. This method does not presume any particular relationship among the variables. It has for this reason become very popular with analysts and also in data mining.

This method has achieved a considerable level of success in its application in the industry. The model has much strength that has led it achieve this success. Some of them include:

MARS has been a very useful tool in solving high dimensional cases especially where there are many explanatory variables.

The model can be used to model both linear and no-linear functions. This makes it a more desired tool by researchers.

In addition to that, MARS is not complicated and can be computed with relative ease. It can also be implemented without many complications, so as to facilitate better comparisons.

The tool can be used even where some data is missing with considerable levels of success.

In its application, MARS is limited by the fact that it requires a large database to be in place to facilitate proper analysis. The analysis also involves thorough evaluation of variables in a bid to identify any underlying relationships. This may make it less comprehensible to a non-expert.

References

Bernhardsen, E. (2005). Working paper: A model of Bankruptcy Prediction. Norges Bank.

Edward, I,. Hotvhkiss, E. (2006). Corporate Financial Distress and Bankruptcy: Predict and
Avoid Bankruptcy. New Jersey: John Wiley & Sons, Inc.

Evans, S. & wang, E. (2007). Bankruptcy for businesses: the benefits, pitfalls, and alternatives:
steps to take to avoid bankruptcy, non-bankruptcy alternatives, and new bankruptcy code
for a business. Irvine, CA: Entrepreneur Press.

Hyunchul, A. Kichun, L & Kyoun-jae, K. (2006). Global optimization of support vector
machines using genetic algorithms for bankruptcy prediction. Seoul:

Dongguk

University.

Jodi, B. Don, G & Michael, A. (2007). A Review of Bankruptcy Prediction

Studies: 1930 to

present. Madison: University of Wisconsin.

Ketz, J. E. (2003). Hidden financial risk: Understanding off-balance sheet

accounting. Hoboken,

N. J: Wiley.

Newton, G. W. (2010). Bankruptcy and insolvency accounting. Hoboken, N. J:

John Wiley &

Sons

Salerno, T. & Kroop, J. (2007). Bankruptcy litigation and practice: a

practitioner’s guide.

Frederick, MD: Wolters Kluwer Law & Business.

Stein, S. (1999). Bankruptcy: a feast for lawyers. Washington, D. C: Beard

Books.

Wahlen, J. M., Baginski, S. P., Bradshaw, M. T., & Stickney, C. P. (2011).

Financial reporting,

financial statement analysis, and valuation: A strategic perspective. Mason,

OH: South-

Western Cengage Learning.