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Predicting Financial Health with a Legalistic AI Approach Emphasizing the Role of Governance System Criteria[1]

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INTRODUCTION

Financial health means the ability to profitability and continuity of activity of the economic unit, which is very important for all shareholders and stakeholders, and all stakeholders in economic units are interested in having appropriate tools that can assess and predict the profitability and continuity of activity

MATERIALS AND METHODS

The purpose of this study is to identify the factors affecting financial health and predict the degree of financial health of companies listed on the Tehran Stock Exchange. For this purpose, the data of 138 companies (1104 companies-years) during the years 2011 to 2018 and Matlab software were used to test the research hypotheses.

RESULTS AND DISCUSSION

Variable selection test performed using an artificial intelligence algorithm to analyze neighboring components showed that among the criteria of the management system, the ratio of non-executive managers,

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the ratio of institutional owners, the size of the audit committee, and the independence of the audit committee and change of CEO to explain the financial health of companies. Also, to predict the degree of financial health of companies listed on the Tehran Stock Exchange, the decision-oriented algorithm of the decision tree was used. The financial health of companies listed on the Tehran Stock Exchange.

CONCLUSION

Considering the importance of identifying the factors affecting the financial health and predicting the financial health of companies, in this research, appropriate indicators have been identified to explain the financial health and also predict the financial health of Tehran Stock Exchange companies with an artificial intelligence-based approach. For this purpose, the information of 138 companies was used during the years 1390 to 1397. The results showed that among the corporate governance criteria, the ratio of non-executive directors, the ratio of institutional owners, the size of the audit committee and the independence of the audit committee, and the change of the CEO to explain the financial health of companies have the highest correlation and the method The rule-based decision tree algorithm has more than 80% ability to predict the financial health of companies. The research results are related to the research of Seyedi et al. (2018), Pourali (2012), Son et al. (2019), and Miglani et al. (2015). These results indicate that some of the criteria of the governance system play their role in improving the company's process correctly, and things such as the independence of the audit committee and the board of directors, as well as the institutional owners, can be mentioned as valuable indicators of the governance system in explaining the financial health of companies. Win. It is suggested that companies increase the level of corporate governance or invest individuals and interest groups in companies that have high levels of institutional ownership and independence of the board of directors compared to other companies because these companies have more financial health than other companies and the situation In general, the obtained information can be used by an informed investor (or other users) to predict the results of actual and potential investments and the financial health rating of companies. Also, the results of this research can be applied to the attention of managers of

the Tehran Stock Exchange by predicting the financial health of companies and working on the factors affecting it, managing the attraction of shareholders' capital, reducing the risk of financial crises and helping investors to avoid Take action against big losses in the stock market.

USING THE TEMPLATE FOR SEVERAL COMPONENTS

The issue of choosing independent variables is one of the issues in artificial intelligence. This issue is effective in classification approaches such as financial health because in these applications there are a large number of independent variables, many of which are either useless or do not have much information. In this research, different independent variables (management systems) have been used to predict financial health. Not removing these independent variables does not create a problem in terms of information, but it increases the computational load of the algorithm. In addition, it causes a lot of useless information to be stored along with useful data. In this article, the neighbor component analysis algorithm is chosen to select the independent variables. This algorithm uses the heuristic search function from the point of view of the production process and the distance-based criterion from the point of view of the evaluation function. The selected independent variables are given to the decision tree learning algorithm to build a model to predict financial health. In this section, the proposed filter approach for selecting independent variables is presented along with the presentation of the financial health forecasting model. This approach consists of two stages, the first stage is the selection of a subset of independent variables by the NCA algorithm and the second stage is building a model to predict financial health based on the decision tree algorithm. The perspective of the proposed method can be seen in Figure 1. First, the data are divided into educational and evaluation groups using the 10-section validation method. The neighbor component analysis algorithm suggests a subset of independent variables. The decision tree algorithm is learned using training data. The best-selected independent variables are returned along with the decision tree model as the output of the proposed approach, and now the evaluation data that the decision tree model has not seen so far are given to the models and the prediction error rate is reported.

TABLES AND FIGURES

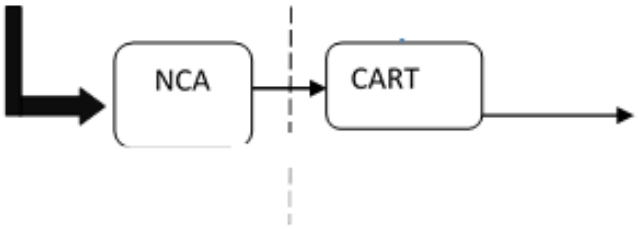

Figure 1. Selection of independent variables and training process

Identification rate has been used to evaluate decision tree models. Also, to implement it fairly and to investigate the phenomenon of over-commitment, the validation method of 10 sections has been used. The company-years are divided into educational and evaluation groups by the validation method of 10 sections. The training data is given to the decision tree algorithm. After executing the learning process of this algorithm, to check how well the classification and regression decision tree model has passed the learning process successfully, the same training data as previously given to the algorithm is given to the model again, with the difference this time the decision tree model predicts the value of the dependent variable. To investigate the occurrence of a phenomenon called over-fitting 10, the test company years that have not yet seen their algorithm are given to the obtained model of the decision tree. The decision tree algorithm predicts the financial health for these company years, it is obtained by comparing the predicted value with the actual value of the efficiency of the model obtained for the company years that the algorithm has not yet observed. This process is carried out by the validation method of 10 sections so that all companies are included as test data at least once and can have more confidence in the result. Figure 1 shows the average of this identification rate. The CART algorithm for never-seen-seen years has a prediction accuracy close to that of training company years with only some added error. Since the difference in the recognition rate of the training and test data is small, overfitting has not happened. This year the recognition rate for the CART algorithm prediction is 84.79 and for the next year, it is 84.76.

Table 1. Average identification rate to evaluate model performance

Prediction accuracy		Algorithm	Prediction accuracy		Algorithm
next year	Current year		next year	Current year	
CART	CART		CART	CART	
test	test		test	Test	
87.63	83.78	2	79.13	81.98	1
86.6	86.49	4	84.28	80.91	3
83.51	89.09	6	78.13	83.78	5
84.38	81.82	8	87.63	80.91	7
86.6	83.64	10	90.72	85.45	7
84.76	next year		4.79	Current year	mean

Predicting financial health with a legalistic AI approach emphasizing the role of governance system criteria

Keywords: Governance System, Financial Health, Legalistic Artificial Intelligence Approach.

JEL Classification: G34, K32, I18,I28.

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