CS514

Applied Artificial Intelligence

Decision Network Project

Submitted By

The Eagle

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Can I Give a Loan to this Company?

Decision Network Project

Description of the Domain:

Determining credit worthiness of a loan applicant is an important decision making process for banks. Interests from the credits are one of the primary source of revenue for bank. However this involves high risk wherein if the loan is given out to a wrong customer, it could end up in a bad loan. Banks are always looking to minimize the percentage of bank loans.

When the loan applicant is an individual the parameters to decide creditworthiness is fairly simple. However, when the banks have to handout loans to corporates and companies, the deciding factors are lot more complex. Macroeconomic parameters become relevant, and subtle features have to be taken into account. This is why this project tries to identify few such features, determine the creditworthiness of a company in simple terms.

Bayesian networks are a kind of probabilistic model which uses causality and counter causality likelihoods to inference a result. They aim to model conditional independence and it is represented by the edges of the graph. We computed the model in the direction of these edges and compute the probabilities of random variables along the direction of the flow. Using these relationships, we can infer the credit-worthiness of a company.

This project is a combination of Bayesian network and influence diagram designed using NETICA.

Features and Rules Used:

Total of 24 nodes/random variables have been used to construct the Bayesian network. The description of these nodes are given below:

Financial Stability: This suggests how stable the company's finances are. This is determined by Market Share, Number of Diverse Products and Company Quality.

Market Share: This suggests how good the company's footprint is in the market. This is determined by the number of competitors in the industry.

Number of Competitors: Number of competitors in the industry for the competing product

Number Of Diverse Products: Number of different products produced by the company

Company Quality: This determines how good the company is with respect to the quality of work they do. Overall company quality is determined from the Industry and number of years in the business.

Number of Years in Business: The number of operating years of the bank

Industry: If the industry is technology, Agro, Education, Telecom or any other.

Assets Value: This suggests how good the assets of the company is. This is determined by

Quick Ratio: Even though inventory of a company is a value of current asset, it can get difficult to turn quickly, particularly when the business of the company is bad. So it is wise to take inventory out of the asset equation and consider only cash, marketable securities and accounts receivable. Such a modified asset equation with current liabilities is quick ratio.

Receivables Turnover: The total amount of receivables divided by the total amount of collections for specific time is the receivables turn. We have considered 1 month as the time period.

Liabilities: The company's liabilities are calculated by various parameters. This node says whether it is high or low.

Current Ratio: This is the ratio between current assets and current liabilities of the company. Current assets and liabilities are usually payable within one year. Some examples of assets are buildings, cash on deposit, Inventory, Guaranteed Investment Accounts, Stocks and Bonds and etc. Some examples of liabilities are loans payable, account overdrafts, income taxes payable, production cost payable, employee salaries payable etc.

Company's Credit Worthiness: This determines how good the credit-worthiness of the company is. This is determined by Company quality, assets, liabilities and financial stability.

Loan Repaid: This node suggests whether the company repays the loan or not.

Loan Reason: This node suggests the reason for which the loan is taken.

Loan Duration: This node suggests how long usually the company takes to repay the loans.

Interest Coverage Ratio: Divide the total operating cash flow, which is earnings before taxes and interest, by the total amount of interest paid on business loans.

Public Image: How the people perceive the company and what they think about its integrity.

Number of Legal Proceedings: Number of legal proceedings that are currently underway in the court of law

Employee Happiness in the Company: Determine the overall employee satisfaction in the company

Deadline Extension: This decision node is used to determine if the extension beyond the loan deadline is to be given or not.

Existing Credit with Bank: This node is used to determine the change in the utility value of the node mentioned above.