

Bankrupt Shield:Hybrid Financial Risk Prediction

Abstract:

Traditional models like Logistic Regression and Decision Trees often face challenges when dealing with imbalanced financial datasets, where the number of non-bankrupt firms is far greater than bankrupt ones. In this project, hybrid optimization techniques are employed to overcome these limitations. The model leverages the Polish Companies Bankruptcy Dataset from Kaggle, which includes several years of financial data with over 64 financial indicators such as net profit, total assets, liabilities, cash flow, and debt ratio.

Financial bankruptcy prediction is a crucial component of modern risk management, helping organizations, investors, and financial institutions identify early signs of financial distress. This study proposes a hybrid predictive model that integrates Machine Learning algorithms with Genetic Algorithm(GA) for feature selection and Particle Swarm Optimization(PSO) for parameter tuning, enhancing the accuracy and reliability of bankruptcy classification.

Using GA, the system identifies the most influential financial attributes, while PSO optimizes model hyper parameters to improve classification accuracy. The hybrid model combines Random Forest and Logistic Regression to classify companies as Bankrupt or Non-Bankrupt.

Keywords:

MachineLearning,GeneticAlgorithm(GA),ParticleSwarmOptimization(PSO),RandomForest, Logistic Regression, Bankruptcy Prediction.

References:

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