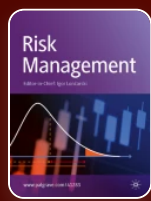


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# Dynamic forecasting of financial distress: the hybrid use of incremental bagging and genetic algorithm—empirical study of Chinese listed corporations

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## Abstract

Financial distress prediction plays an important role in affecting the healthy development of the firm. Previous studies on financial distress prediction have chiefly built prediction models based on static data samples within a period of time, which cannot adapt to the changing economic environment or the changing enterprise operational environment. To achieve dynamic financial distress prediction, the incremental bagging based on selective ensemble is proposed. Genetic algorithm is employed to optimize the base classifier combination for further forecasting of financial distress per year. Financial datasets from 2005 to 2014 of Chinese real data were collected and represented in terms of significant six-variable financial ratios. In order to verify the prediction capability of the

proposed method, comparative analysis with three commonly used dynamic prediction method is conducted. Empirical results indicate that the proposed method helps model producing more accurate performance on financial data stream. This method of using incremental bagging with selective ensemble and optimizing classifier combination is useful in controlling risk in financial management.

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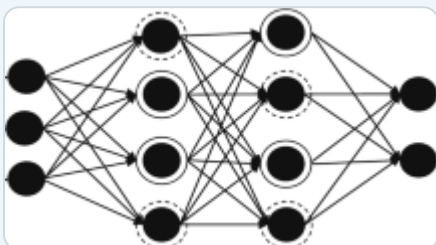
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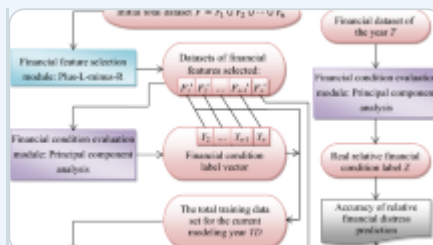
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# References

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Alfaro, E., N. García, M. Gámez, and D. Elizondo. 2008. Bankruptcy Forecasting: An Empirical Comparison of AdaBoost and Neural Networks. *Decision Support Systems* 45 (1): 110-122.

[Article](#) [Google Scholar](#)

Altman, E.I. 1968. Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *The Journal of Finance* 23 (4): 589-609.

[Article](#) [Google Scholar](#)

Beaver, W.H. 1966. Financial Ratios as Predictors of Failure. *Journal of Accounting Research*: 71-111.

Beaver, W.H., M.F. McNichols, and J.W. Rhie. 2005. Have Financial Statements Become Less Informative? Evidence from the Ability of Financial Ratios to Predict Bankruptcy. *Review of Accounting Studies* 10 (1): 93-122.

[Article](#) [Google Scholar](#)

Breiman, L. 1996. Bagging Predictors. *Machine Learning* 24 (2): 123-140.

[Google Scholar](#)

Call, J.M. 2005. Genetic Algorithms for Modeling and Optimization. *Journal of Computational and Applied on Mathematics* 184: 205-222.

[Article](#) [Google Scholar](#)

Cao, Y. 2012. MCELCCh-FDP: Financial Distress Prediction with Classifier Ensembles Based on Firm Life Cycle and Choquet Integral. *Expert Systems with Applications* 39 (8): 7041-7049.

[Article](#) [Google Scholar](#)

Cortés, E.A., M.G. Martínez, and N.G. Rubio. 2007. Multiclass Corporate Failure Prediction by Adaboost. M1. *International Advances in Economic Research* 13 (3): 301-312.

[Article](#) [Google Scholar](#)

Ding, Y., X. Song, and Y. Zen 2008. Forecasting Financial Condition of Chinese Listed Companies Based on Support Vector Machine. *Expert Systems with Applications* 34 (4): 3081-3089.

[Article](#) [Google Scholar](#)

Frydman, H., E.I. Altman, and D.L. KAO. 1985. Introducing Recursive Partitioning for Financial Classification: The Case of Financial Distress. *The Journal of Finance* 40 (1): 269-291.

[Article](#) [Google Scholar](#)

Geng, R., I. Bose, and X. Chen. 2015. Prediction of Financial Distress: An Empirical Study of Listed Chinese Companies Using Data Mining. *European Journal of Operational Research* 241 (1): 236-247.

[Article](#) [Google Scholar](#)

Harris, T. 2015. Credit Scoring Using the Clustered Support Vector Machine. *Expert Systems with Applications* 42 (2): 741-750.

[Article](#) [Google Scholar](#)

Hol, S. 2007. The Influence of the Business Cycle on Bankruptcy Probability. *International Transactions in Operational Research* 14 (1): 75-90.

[Article](#) [Google Scholar](#)

Kim, M.J., and D.K. Kang. 2010. Ensemble with Neural Networks for Bankruptcy Prediction. *Expert Systems with Applications* 37 (4): 3373–3379.

[Article](#) [Google Scholar](#)

Kim, M.J., S.H. Min, and I. Han. 2006. An Evolutionary Approach to the Combination of Multiple Classifiers to Predict a Stock Price Index. *Expert Systems with Applications* 31 (2): 241–247.

[Article](#) [Google Scholar](#)

Klinkenberg, R. 2004. Learning Drifting Concepts: Example Selection vs. Example Weighting. *Intelligent Data Analysis* 8 (3): 281–300.

[Google Scholar](#)

Lee, S., and W.S. Choi. 2013. A Multi-industry Bankruptcy Prediction Model Using Back-Propagation Neural Network and Multivariate Discriminant Analysis. *Expert Systems with Applications* 40 (8): 2941–2946.

[Article](#) [Google Scholar](#)

Li, H., and J. Sun. 2012. Forecasting Business Failure: The Use of Nearest-Neighbour Support Vectors and Correcting Imbalanced Samples—Evidence from the Chinese Hotel Industry. *Tourism Management* 33 (3): 622–634.

[Article](#) [Google Scholar](#)

Lin, F., C.C. Yeh, and M.Y. Lee. 2011. The Use of Hybrid Manifold Learning and Support Vector Machines in the Prediction of Business Failure. *Knowledge-Based Systems* 24 (1): 95–101.

[Article](#) [Google Scholar](#)

Min, J.H., and Y.C. Lee. 2005. Bankruptcy Prediction Using Support Vector

Machine with Optimal Choice of Kernel Function Parameters. *Expert Systems with Applications* 28 (4): 603–614.

[Article](#) [Google Scholar](#)

Min, S.H., J. Lee, and I. Han. 2006. Hybrid Genetic Algorithms and Support Vector Machines for Bankruptcy Prediction. *Expert Systems with Applications* 31 (3): 652–660.

[Article](#) [Google Scholar](#)

Odom, M.D., and R. Sharda. 1990. A Neural Network Model for Bankruptcy Prediction. In *1990 IJCNN International Joint Conference on neural networks*, pp. 163–168.

Ohlson, J.A. 1980. Financial Ratios and the Probabilistic Prediction of Bankruptcy. *Journal of accounting research*: 109–131.

Patrick, P. 1932. A Comparison of Ratios of Successful Industrial Enterprises with Those of Failed Firms. *Certified Public Accountant* 2: 598–605.

[Google Scholar](#)

Sun, J., K.Y. He, and H. Li. 2011. SFFS-PC-NN Optimized by Genetic Algorithm for Dynamic Prediction of Financial Distress with Longitudinal Data Streams. *Knowledge-Based Systems* 24 (7): 1013–1023.

[Article](#) [Google Scholar](#)

Sun, J., and H. Li. 2008a. Listed Companies' Financial Distress Prediction Based on Weighted Majority Voting Combination of Multiple Classifiers. *Expert Systems with Applications* 35 (3): 818–827.

[Article](#) [Google Scholar](#)

Sun, J., and H. Li. 2008b. Data Mining Method for Listed Companies' Financial Distress Prediction. *Knowledge-Based Systems* 21 (1): 1-5.

[Article](#) [Google Scholar](#)

Sun, J., and H. Li. 2011. Dynamic Financial Distress Prediction Using Instance Selection for the Disposal of Concept Drift. *Expert Systems with Applications* 38 (3): 2566-2576.

[Article](#) [Google Scholar](#)

Sun, J., and H. Li. 2012. Financial Distress Prediction Using Support Vector Machines: Ensemble vs. Individual. *Applied Soft Computing* 12 (8): 2254-2265.

[Article](#) [Google Scholar](#)

Sun, J., H. Li, and H. Adeli. 2013. Concept Drift-Oriented Adaptive and Dynamic Support Vector Machine Ensemble with Time Window in Corporate Financial Risk Prediction. *IEEE Transactions on Systems, Man, and Cybernetics: Systems* 43 (4): 801-813.

[Article](#) [Google Scholar](#)

Sun, J., H. Li, P.C. Chang, and Q.H. Huang. 2015. Dynamic Credit Scoring Using B & B with Incremental-SVM-Ensemble. *Kybernetes* 44 (4): 518-535.

[Article](#) [Google Scholar](#)

West, D., S. Dellana, and J. Qian. 2005. Neural Network Ensemble Strategies for Financial Decision Applications. *Computers & Operations Research* 32 (10): 2543-2559.

[Article](#) [Google Scholar](#)

Wu, C.H., G.H. Tzeng, Y.J. Goo, and W.C. Fang. 2007. A Real-Valued Genetic

Algorithm to Optimize the Parameters of Support Vector Machine for Predicting Bankruptcy. *Expert Systems with Applications* 32 (2): 397–408.

[Article](#) [Google Scholar](#)

Zhao, Q.L., Y.H. Jiang, and M. Xu. 2010. Incremental Learning by Heterogeneous Bagging Ensemble. In *Advanced Data Mining and Applications*, pp. 1–12. Berlin: Springer.

Zhou, Z.H., J. Wu, and W. Tang. 2002. Ensembling Neural Networks: Many Could be Better than All. *Artificial Intelligence* 137 (1): 239–263.

[Article](#) [Google Scholar](#)

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