

模糊徑向基網路及其在授信評等之應用

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摘要

銀行在辦理放款業務時，或多或少具有某些程度的風險，因此評估申貸者的信用是很重要的。台北市銀行公會所使用之企業信用評等表，其可分為三大部分：「財務狀況評等」、「經營管理」、「產業特性暨展望」。對於財務狀況評分方式，乃由各企業之財務比率分別給予1分、2分、...、或5分。其評分方式缺乏「抗驟變性」與無法滿足「靈敏性」，因此本研究對於財務狀況建立一模糊評分系統，以Syau, Hsish, 及Lee所提出之方法求得非對稱三角模糊數之中心，並以均勻分配產生非對稱模糊數之左右兩端點。另外，由於徑向基網路應用在函數的近似上有極好效果，因此以Cheng及Lee所提出模糊徑向基網路，建構一良好自動化財務評等模式。

關鍵詞：財務授信評等，模糊徑向基網路，模糊迴歸分析

目錄

封面內頁 簽名頁 授權書 .iii 中文摘要 v Abstract vi 誌謝 vii 目錄 viii 圖目錄 x 表目錄 xii 第一章 緒論 1 1.1研究背景與動機 1
1.2研究方法 5 1.3研究目的 7 1.4研究架構 7 第二章 相關理論 8 2.1模糊理論 8 2.1.1 模糊集合論 8 2.1.2 模糊數與模糊數的運算 10 2.2模糊迴歸分析 12 2.3 k-mean clustering 14 2.4主成份分析 15 2.5模糊徑向基網路 18 2.5.1徑向基網路之架構 19 2.5.2 模糊徑向基網路之架構 20 2.5.3網路參數學習法則 22 第三章 研究方法 24 3.1蒐集資料 25 3.2模糊評分系統 26 3.3財務比率資料前處理 29 3.4建立模糊徑向基網路架構及其演算法 30 3.4.1模糊徑向基網路架構 31 3.4.2模糊徑向基網路之學習演算法 33 3.5網路績效衡量 37 第四章 實證結果與分析 38 第五章 結論與建議 42 參考文獻 43 附錄A 47 附錄B 51 附錄C 56 附錄D 65

參考文獻

- [1] 汪培庄，「模糊集合論及其應用」，民國生產力中心，民國七二年十二月。
- [2] 張建邦，「多變量分析」，三民書局，民國八十六年。
- [3] 陳耀茂，「多變量分析導論」，全威圖書有限公司，民國91年。
- [4] 蔡秋鳳、陳耀竹，「企業財務狀況評等-模糊集合在會計學上之應用」，台北市銀行月刊，第二十一卷第十二期，67-85頁，79年11月。
- [5] 謝海德，「模糊集合在授信決策上之應用」，私立元智大學，碩士論文，88年。
- [6] 劉錦輝，「結合模糊迴歸分析與品質機能展開於工程設計之最佳化」，私立朝陽科技大學，民國九十一年。
- [7] 蘆蘆，「實用模糊數學」，亞東書局，民國八十年十一月。
- [8] Bandemer, H., "Evaluating explicit functional relationships from fuzzy observations", Fuzzy Sets and Systems, 16, 1985, pp 41-52.
- [9] Celmins, A., "Least squares model fitting to fuzzy vector data", Fuzzy Sets and Systems, 22, 1987a, pp 245-269.
- [10] Celmins, A., Least squares optimization with implicit model equations, in: A.V.Fiacco, ed., Mathematical Programming with Data Perturbations II(Marcel Dekker, N. Y., 1983), pp 131-152.
- [11] Cheng C.B. and Lee E.S., "Fuzzy regression with radial basis function network." Fuzzy Sets and Systems, 119, pp 291-301, 2001 [12] Chang, P. T. and Lee, E. S., "Ranking of fuzzy sets based on the concept of existence," Computers Math. Applic., 27, 1994b, pp 1-21.
- [13] Diamond, P., "Least squares fitting of several fuzzy variables," The 2nd IFSA Congress, Tokyo, July 1987, pp 329-331.
- [14] Diamond, P., "Fuzzy least squares, Information Science," 46, 1988, pp 141-157.
- [15] Heshmaty, B., and kandel, A., "Fuzzy linear regression and its applications to forecasting in uncertain environment," Fuzzy Sets and Systems, 15, 1985, pp 159-191.
- [16] Moody, J., Darken, C. J., "Fast learning in networks of locally- tuned processing units", Neural Comput". 1, pp 281-294.
- [17] Jang, J. S. R., Sun, C. T., and Mizutani, E., "Neuro-Fuzzy and Soft Computing", 1998.
- [18] Jozsef, S., Probabilistic principles and methods in fuzzy regression, in J.Kacprzyk & M.Fedrizzi, eds., Fuzzy Regression Analysis (Omnitech Press, Warsaw and Physica-Verlag, Heidelberg, 1992), pp194-207.
- [19] Kim, J.K., Han, C. H. and Choi, S.H., 1998, "A knowledge-base Approach to the quality function deployment," Computers & Industrial Engineering, 35(1-2), pp 233-236.

- [20] Kovacs, M., Fuzzy linear model fitting to fuzzy observations, in J. Kacprzyk & M. Fedrizzi, eds., *Fuzzy Regression Analysis* (Omnitech Press, Warsaw and Physica-Verlag, Heidelberg, 1992), pp 116-123.
- [21] Monskowitz, H. and Kim, K., "Onassessing the H value in fuzzy linear regression," *Fuzzy Sets and Systems*, 58, 1993, pp 303-327.
- [22] Smith M., "Neural Networks for Statistical Modeling", Van Nostrand Reinhold, New York, 1993.
- [23] Solymosi, T. and Dombi, J., Fitting Functions to data with error bounds: fuzzy regression with ERRGO, in J. Kacprzyk & M. Fedrizzi, eds., *Fuzzy Regression Analysis* (Omnitech Press, Warsaw and Physica-Verlag, Heidelberg, 1992), pp 101-115.
- [24] Tanaka, H., Hayashi. I. and Watada, J., "Possibilistic linear regression analysis for fuzzy data," *European Journal of Operational Research*, 40, pp 389-396, 1989.
- [25] Tanaka, H., Uejima, S. and Asai, K., "Linear regression analysis with fuzzy model," *IEEE Transactions on Systems, Man, and Cybernetics*, 12, pp 903-907, 1982.
- [26] Tanaka, H., Ishibuchi, H. and Yoshikawa, S., "Exponential possibility regression analysis, " *Fuzzy Sets and Systems*, 69 1995, pp 305-318.
- [27] Tanaka, H., and Watada, J., "Possibilistic linear systems and their applications to the linear regression model," *Fuzzy Sets and Systems*, 27, 1988, pp 275-289.
- [28] Wang, X. and Ha, M., " Fuzzy Linear regression analysis," *Fuzzy Sets and Systems*, 51, 192, pp 179-188.
- [29] Wang, Z. Y. and Li, S. M., "Fuzzy linear regression analysis of fuzzy valued variables," *Fuzzy Sets and Systems*, 36, 1990, pp 125-136.
- [30] Syau, Y. R., Hsish, H. T and Lee, E. S., "Fuzzy Numbers in the Credit Rating of Enterprise Financial Condition," *Review of Quantitative Finance and Accounting*, 17, pp 351-360, 2001.
- [31] Zadeh, L. A. "Fuzzy Set, "Information and Control, 8, pp 338-353, 1965.