

A Study of Enterprise Personnel Selection using Fuzzy Association Rule

余承翰、陳振東

E-mail: 9422521@mail.dyu.edu.tw

ABSTRACT

Recently, the enterprise gradually realizes that the good human resource, is the key factor to gain the competitive advantage. Therefore, the human resource management has become the most important work for enterprise to maintain the strength of market competition. Under this situation, how to find or select the good employee is the first challenge for enterprise. In general, personnel selection is usually to review his applicant and judge his ability to match the job. In fact, if the enterprise can not choose the suitable talented person that it will create the waste of manpower and increase the management cost. It is difficult to find the suitable person form review the applicants. In the personnel selection process, the subject judgement of managers are usually fuzziness. Therefore, the aim of this study is to combine the fuzzy sets theory with association rule, to look for suitable person with the higher steady degree. In order to prove that the proposed method is feasible, a case study is implemented in this study. According to the result of case study, the average accuracy rate is up to 71% for predicting the steady degree of employees.

Keywords : Personnel selection, Fuzzy sets theory, Data mining, Association rule

Table of Contents

目錄 封面內頁 簽名頁 授權頁 iii 中文摘要 iv 英文摘要 v 誌謝 vi 目錄 vii 圖目錄 ix 表目錄 x 第一章緒論 1 第一節研究背景 1 第二節研究動機 2 第三節研究目的 3 第四節研究流程 5 第二章文獻探討 7 第一節人才甄選 7 第二節模糊理論 14 第三節資料探勘 22 第三章研究方法 26 第一節關聯法則 26 第二節模糊關聯法則 29 第三節範例說明 31 第四節人才甄選決策分析流程 37 第四章系統開發與實證分析 38 第一節系統建構環境 38 第二節系統畫面說明 39 第三節實證分析 41 第四節問題探討 58 第五章結論與建議 60 第一節結論 60 第二節後續研究與建議 61 參考文獻 63 附錄 69 圖目錄 圖1-1 研究流程 6 圖2-1 三角模糊數 16 圖2-2 某一維度的三角模糊數之隸屬函數 17 圖2-3 Mamdani 推論法 21 圖3-1 年齡的隸屬函數 32 圖3-2 學歷的隸屬函數 32 圖3-3 扶養人數的隸屬函數 32 圖3-4 在職期間的隸屬函數 33 圖3-5 人才甄選決策分析流程 37 圖4-1 新增應徵者基本資料 39 圖4-2 基本資料修改及刪除 40 圖4-3 模糊推論 40 圖4-4 結果呈現 41 圖4-5 實驗流程 42 圖4-6 在職期間的隸屬函數 45 圖4-7 各組推論準確率的比較 56 表目錄 表2-1 AND 與OR 運算子 19 表2-2 蘊含運算子 20 表3-1 個人基本資料 31 表3-2 各屬性的隸屬程度 33 表3-3 各屬性的模糊支持度 34 表3-4 二個屬性間組合的模糊支持度 35 表3-5 三個屬性間組合的模糊支持度 35 表3-6 四個屬性間組合的模糊支持度 35 表3-7 模糊關聯法則 36 表4-1 資料欄位說明 43 表4-2 屬性對照表 44 表4-3 各個屬性的隸屬函數 46 表4-4 以76 筆當訓練資料的模糊關聯法則 47 表4-5 以76 筆中的10%當驗證資料所得的模糊關聯法則 49 表4-6 以76 筆中的20%當驗證資料所得的模糊關聯法則 49 表4-7 以76 筆中的30%當驗證資料所得的模糊關聯法則 50 表4-8 以76 筆中的40%當驗證資料所得的模糊關聯法則 51 表4-9 以76 筆中的50%當驗證資料所得的模糊關聯法則 51 表4-10 對照各個法則的隸屬程度 51 表4-11 個人基本資料表 52 表4-12 實際與推估資料誤差表 53 表4-13 抽取50%當驗證資料的推論準確率 54 表4-14 抽取40%當驗證資料的推論準確率 54 表4-15 抽取30%當驗證資料的推論準確率 55 表4-16 抽取20%當驗證資料的推論準確率 55 表4-17 抽取10%當驗證資料的推論準確率 56 表4-18 平均推論準確率 57 表4-19 推論準確率最高的模糊關聯法則 57

REFERENCES

- [1] 方世榮編譯, 現代人力資源管理, 華泰書局, 民國90年。
- [2] 吳秉恩, 分享式人力資源管理, 翰盧圖書出版有限公司, 民國88年。
- [3] 張火燦, 策略性人力資源管理, 初版, 揚智出版社, 民國85年。
- [4] 黃英忠, 現代人力資源管理, 再版, 華泰書局, 民國84年。
- [5] 黃英忠, 人力資源管理, 三民書局, 民國86年。
- [6] 黃英忠、曹國雄、黃同圳、張火燦、王秉鈞, 人力資源管理, 華泰書局, 民國87年。
- [7] Agrawal, R., Imlienski. T. and Arun. S, " Mining association rules between sets of items in large databases, " In Proceedings of ACM SIGMOD International Conference on Management of Data, Vol.22, pp. 207-216, 1993.
- [8] Agrawal, R. and R. Srikant, " Fast algorithm for mining association rules, " In Proceedings of the 20th International Conference on Very Large Databases, pp. 487-499, 1994.

- [9] Ashforth, B. and F. Mael, " Social identity theory and the organization, " *Academy of Management Review*, Vol.14, pp.20-39, 1989.
- [10] Bugarin, A.J. and S. Barro, " Reasoning with truth values on compacted fuzzy chained rules, " *IEEE Transaction on System*, Vol. 28, pp.34-46, 1998.
- [11] Chen, S.M., " A fuzzy reasoning approach for rule-based systems based on fuzzy logics, " *IEEE Transaction on System*, Vol. 26, pp.769-778, 1996.
- [12] Cohen, Y. and J. Pfeffer, " Organization hiring standards, " *Administrative Science Quarterly*, Vol.32, pp.1-24, 1986.
- [13] Dubois, D. and H. Prade, *Fuzzy sets and systems:theory and applications*, Academy Press, 1980.
- [14] Eder, R., and R. Buckley, *The employment interview: An interactionist perspective*, *Resarch in Personnel and human resources management*, Ferris, G. and k. Rowland(Eds), pp.75-107,1988.
- [15] Fayyad, U., G. P. Shapiro and P. Smyth , " From data mining to knowledge discovery in database, " *AI magazine*, Vol.17, pp.37-54, 1996.
- [16] Ferris, G., M.Buckley and G. Allen , " Promotion systems in organization, " *Human Resource Planning*, Vol.15, pp.47-68 , 1992.
- [17] Han, J. and M. Kamber, *Data Mining : Concepts and Techniques*, John Wiley & Son, 2001.
- [18] Heneman , H., D. Schwab, J. Fossum and L.Dyer, *Person/human resource management*, IL:Irwin, 1989.
- [19] Herriot, P., *Selection as a social process*, *Advances in selection and assessment*, Smith, M. and Robertson(Eds), pp.171-188, 1989.
- [20] Hong, T. P., K.Y. Lin and S. L. Wang , " Fuzzy data mining for interesting generalized association rules, " *Fuzzy Sets and Systems* 138 , pp. 255 – 269 , 2003.
- [21] Hu, Y.C., J.S. Hu, R.S. Chen and G.H. Tzeng, " Assessing weights of product attributes from fuzzy knowledge in a dynamic environment, " *European Journal of Operational Research*, Vol. 154, pp.125-143, 2004.
- [22] Hu, Y.C., R.S. Chen and G.H. Tzeng, " Mining fuzzy association rules for classification problems, " *Computers and Industrial Engineering*, Vol. 43, pp.735-750, 2002.
- [23] Ishibuchi, H., K. Nozaki and H. Tanaka, " Distributed representation of fuzzy rules and its application to pattern classification, " *Journal of Fuzzy Sets and Systems*, Vol.52, pp.21-32 , 1992.
- [24] Ishibuchi, H., K. Nozaki, N. Yamamoto and H. Tanaka , " Selecting fuzzy if-then rules for classification problems using genetic algorithms, " *IEEE Transcation on FuzzySystems* , Vol.3, pp.260-270, 1995.
- [25] Ishibuchi, H., T. Nakashima and T. Yamamoto, " Fuzzy association rules for handling continuous attributes, " *Proceedings of IEEE International Symposium on Industrial Electronics*, Vol.1, pp.118-121, 2001.
- [26] Ishibuchi, H., T. Yamamoto and T. Nakashima, " Fuzzy data mining: effect of fuzzy discretization, " *Proceedings of the 1st IEEE International Conference on Data Mining*, pp.241-248, 2001.
- [27] Kaufmann, A. and M.M. Gupta, *Introduction to fuzzy arithmetic :theory and application*, Van Nostrand Reinhold, New York, 1991 .
- [28] Kim,S.M., J.D. Kim, J.H. Hong, D.W. Nam, D.H. Lee and J.Y. Lee, *A System for Association Rule Finding from an Internet Portal Site*, 2000.
- [29] Kleissner, C., " Data mining for the enterprise, " *Proc of the Thirty-First Hawaii International Conference*, Vol. 7, pp.295-304, 1998.
- [30] Lee, C. C., " Fuzzy logic in control systems: fuzzy logic controller, Part II, " *IEEE Transactions on Systems*, Vol.20, pp. 419-435, 1990.
- [31] Michael, J.A. and G. Linoff, *Data Mining Technique: for Marketing, Sales and Customer Support*, Wiley Computer Publishing, New York, 1997.
- [32] Mills, D., " Seniority versus ability in promotion decisions, " *Industrial and Labor Relation Review*, Vol.38, pp.421-425, 1985.
- [33] Mitra, S., S.K. Pal and P. Mitra , " Data mining in soft computing framework: A survey, " *IEEE Transactions on Neural Networks* , Vol.13 , pp3-14 , 2002.
- [34] Robertson, I. and M. M. Smith, *Personnel selection methods*, *Advances in selection and assessment*, pp.89-112, 1989.
- [35] Rynes, S.L., R.D. Bretz and B. Gerhart, " The importance of recruitment in job choice:A different way of looking, " *Personnel Psychology*, Vol.44, pp.487-521, 1991.
- [36] Schuler, R. S., *Strategic Human Resource Management: Linking the People with the Strategic Needs of the Business*, *Organizational Dynamic*, pp.18-32, 1992.
- [37] Simoudis, E., " Reality check for data mining, " *IEEE Expert*, Vol.11 , pp.26-33, 1996.
- [38] Smither, J.W., R.R. Reiley, R.E. Millsap, K. Pearlman and R.W. Stoffey, " Applicant reactions to selection procedures, " *Personnel Psychology*, Vol.46, pp.49-76, 1993.
- [39] Tichy, N. M., C.J. Fombrun and M.A. Devanna, " Strategic human resource management, " *Sloan Management Review*, Winter,Vol.23, pp.47-61, 1982.
- [40] Uehara, K. and M. Fujise, " Fuzzy inference based on families of α -level sets, " *IEEE Ttransaction on Fuzzy Systems*, Vol. 1, pp.205-221, 1993.
- [41] Ulrich, D., " Measuring human resources: an overview of practice and a prescription for results, " *Human Resource Management*, Vol.36, pp.303-320, 1997.
- [42] Vandenberg, R. and V. Scarpello, " The matching model:An examination of the process underlying realistic job previews, " *Journal of*

Applied Psychology, Vol.75, pp.60-67, 1990.

[43] Wright, P.M. and G.C. McMahan, " Theoretical perspectives for strategic human resource management, " Journal of Management, Vol.18, pp.295-320, 1992.

[44] Yuan, K., Fuzzy Sets and Fuzzy Logic – Theory and Applications, Prentice Hall, 1995.

[45] Zadeh, L.A., " The concept of a linguistic variable and its application to approximate reasoning I, II, III, " Information Science, Vol.8,pp.199-251,pp.301-357, Vol.9,pp. 43-80, 1975.

[46] Zadeh, L.A., " Fuzzy Sets, " Information and Control, Vol.8, pp.338-353, 1965.

[47] Zhang, C. and S. Zhang ,Association rule mining: model and algorithms, Springer-Verlag Berlin Heidelberg, New York, 2002.