A Study of Engineering Process Control Using Neural Network

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ABSTRACT

“Statistical process control”(SPC) and “Engineering Process Control”(EPC) are two major tools to improve engineering process quality. SPC uses control plan to monitor the quality attributes as the basis for quality improvement. However, when using the traditional control plan in monitoring, the quality attributes being measured have to be assumed as mutually independent from each other as well as comply with normal distribution. However, in continuous engineering process or manufacturing environment of extremely narrow sampling distance, marked relevance exists in between data, and thus affects the application effects of the control plan. EPC mainly uses the relationship between the manufacturing process input and output to compensate or adjust the manufacturing process by adjusting the controllable variables, making the engineering process outputs approach the target values to improve the engineering quality. When the engineering process is interrupted in stable status, if the output result of the next time point can be predicted, the controllable factor may be adjusted, making the output value of next time point achieve the target values. However, it is not easy to get the next time point quality attribute in the actual engineering process. The present study mainly uses the neural network capabilities and statistical regression to establish the EPC adjustment model for application in the prediction of engineering output values while simulation values are used to illustrate the application of the established models. The simulation results indicate that the quasi-neural network prediction can be applied in the EPC engineering process control.

Keywords : engineering process control ; quasi-neural network ; regression analysis

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REFERENCES

中文部份: 1.吳宗正，1993，迴歸分析，三民書局，台北。 2.李芸茜，2005，應用灰理論於工程製程管制之研究，大葉大學工業工程系研究所碩士論文。 3.許君純譯，1999，預測的原理與應用，台灣西書出版社，台北。 4.陳鄭勇，1990，整合SPC與EPC以建構自我相關性製程之回饋控制系統，中原大學工業工程學系研究所碩士論文。 5.張智星，2000，MATLAB程式設計與應用，清蔚科技股份有限公司，新竹。 6.葉怡成，1997，應用類神經網路，儒林圖書有限公司，台北。 7.葉怡成，2002，類神經網路模式應用與實作，儒林圖書有限公司，台北。 8.鄭春生，2001，品質管理，三民書局股份有限公司。 9.蘇木春、張孝德，2004，機器學習:類神經網路、模糊系統以及基因演算法則，全華科技圖書股份有限公司，台北。 10.羅華強，2001，類神經網路-Matlab的應用，清蔚科技股份有限公司，新竹。 英文部分: 11.Angela, P.A., M.E. Camargo, R. Radharamanan and D.G. Petry,1996,Sales Forecasting Using Time Series and Neural Networks, Computers Industry Engineering,31,pp.421-424. 12.Baba,N. and M. Kozaki,1992,An Intelligent Forecasting System of Stock Price Using Neural Networks, Proceedings of the International Joint Conference on Neural Networks,pp.371-377. 13.Box, George E.P., and Jenkins,G.M.,1994, “Time Series Analysis: Forecasting and Control”,3nd Edition. 14.Box, George E.P., and Tim Kramer,1992,Statistical Process Monitoring and Feedback Adjuetment-A Discussion ,Techonometrics,pp251-267. 15.Chang, S.I. and C.A.AW, 1996, A Neural Fuzzy Control Chart for Detecting and Classifying Process Means Shifts, International Journal of Production Research, 34(8), pp2265-2278. 16.Kao.J.J. and S.S.Huang,2000, Forecasts Using Neural Network Sversus Box-Jenkins Methodology for Ambient Air Quality Monitoring Data,J.Air & Waste Manage.Assoc.,50,pp.219-226.