

基於類神經網路與交叉驗證法之田口方法(Taguchi method based on neural networks and cross validation methodology)

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摘要

To overcome the shortcomings of traditional Taguchi method, this study proposed a Taguchi method based on neural networks and cross validation methodology. Its main ideas included that (1) it used cross-validation methodology to overcome the shortcoming that neural networks need to separate the dataset into training set and testing set, which makes training set insufficient, (2) it used sensitive analysis and the main effect diagram to overcome the shortcoming that neural networks are black box model, and (3) it used nonlinear programming to find the optimum combination of factor level. Two examples that had been solved by traditional Taguchi method were examined to verify the proposed method. It was demonstrated that (1) the prediction error is seriously underestimated in traditional Taguchi method, which does not separate the dataset into the testing set and training set, (2) under the same cross validation methodology, the proposed neural network-based Taguchi method is much more accurate than the traditional one, (3) the sensitive analysis and the main effect diagram truly can express the relationship between factors and responses, and improve the explanatory capacities of neural networks, (4) the nonlinear programming truly can find the optimum combination of factor level.

關鍵字：Taguchi method, artificial neural network, cross-validation, sensitivity analysis