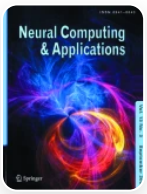
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Application of MLP Networks to Bond Rating and House Pricing

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Abstract

Feedforward neural networks are receiving growing attention as a data modelling tool in economic classification problems. It is well known that controlling the design of a neural network can be cumbersome. Inaccuracies may lead to numerous problems in the application, such as higher errors due to local optima, overfitting and ill-conditioning of the network, especially when the number of observations is small. In this paper we provide a method to overcome these difficulties by regulating the flexibility of the network, and by rendering measures for validating the final network. In particular, a method is proposed to equilibrate the number of hidden neurons based on 5-fold cross-validation. In the validation process, the performance of the neural network is compared with a linear model using 5- fold cross-validation. In both case studies, the degree of monotonicity of the output of the neural network, with respect to each input variable, is calculated by numerical differentiation. The outcomes of this analysis are compared to what is expected from economic theory. Furthermore, a special class of monotonic neural networks and a corresponding training algorithm are developed. It is shown in the second case study that networks in this class have less tendency to

overfitting than ordinary neural networks. The methods are illustrated in two case studies: predicting the price of housing in the Dutch city of Den Bosch; and the classification of bond ratings.

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