Single-hidden layer neural networks for forecasting intermittent demand.

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Resumen: Managing intermittent demand is a vital task in several industrial contexts, and good forecasting ability is a fundamental prerequisite for an efficient inventory control system in stochastic environments. In recent years, research has been conducted on single-hidden layer feedforward neural networks, with promising results. In particular, back-propagation has been adopted as a gradient descent-based algorithm for training networks. However, when managing a large number of items, it is not feasible to optimize networks at item level, due to the effort required for tuning the parameters during the training stage. A simpler and faster learning algorithm, called the extreme learning machine, has been therefore proposed in the literature to address this issue, but it has never been tried for forecasting intermittent demand. On the one hand, an extensive comparison of single-hidden layer networks trained by back-propagation is required to improve our understanding of them as predictors of intermittent demand. On the other hand, it is also worth testing extreme learning machines in this context, because of their lower computational complexity and good generalisation ability. In this paper, neural networks trained by back-propagation and extreme learning machines are compared with benchmark neural networks, as well as standard forecasting methods for intermittent demand on real-time series, by combining

different input patterns and architectures. A statistical analysis is then conducted to validate the best performance through different aggregation levels. Finally, some insights for practitioners are presented to improve the potential of neural networks for implementation in real environments. [ABSTRACT FROM AUTHOR]

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