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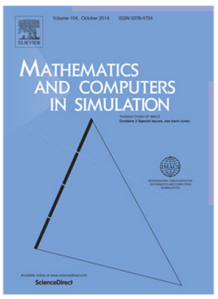

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Microforecasting methods for fresh food supply chain management: a computational study

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Abstract

We address the problem of forecasting sales for fresh and highly perishable products, in the general context of supply chain management. The forecasting activity refers to the single item in a given store and started from a pre-processing phase for data analysis and normalization. Then data was used as input for a forecasting algorithm designed to be user interactive. We implemented three forecasting methods: ARIMA, ARIMAX and transfer function models. The exogenous components of the forecasting models took the impact of prices into account. The best configuration of these models is dynamically chosen via two alternative methods: (i) a two-step procedure, based on properly selected statistical indicators, (ii) a Sequential Parameter Optimization approach for automatic parameter tuning. The user or the decision maker at the store level should not be exposed to the complexity of the forecasting system which—for this reason—is designed to adaptively select the best model configuration at every forecast session, to be used for each item/store combination. A set of real data based on 19 small and medium sized stores and 156 fresh products was employed to evaluate both quality of forecasting results and their effects on the order planning activity, where sales forecasting is considered as a proxy of the expected demand. Some examples are reported and discussed. Our results confirm that there is no 'one-size-fits-all' forecasting model, whose performance strictly depends on the specific characteristics of the underlying data. This supports the adoption of a data-driven tool to automate the dynamic selection of the most appropriate forecasting model.

Keywords: fresh food supply chain, forecasting, ARIMA, ARIMAX, transfer

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