

Pseudoinverse learning of Fuzzy Cognitive Maps for multivariate time series forecasting

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Forecasting multivariate time series is an important problem considered in many real-world scenarios. To deal with that problem, several forecasting models have already been proposed, where Fuzzy Cognitive Maps (FCMs) are proved to be a suitable alternative. The key limitation of the existing FCM-based forecasting models is the lack of time-efficient learning algorithms. In this paper, we plug that gap by proposing a new FCM learning algorithm which is based on Moore-Penrose inverse. Moreover, we propose an innovative approach that equips FCM with long-term, multistep prediction capabilities. A huge advantage of our method is the lack of parameters which in the case of competitive approaches require laborious adjustment or tuning. The other added value of our method is the reduction of the processing time required to train FCM. The performed experiments revealed that FCM trained using our method outperforms the best FCM-based forecasting model reported in the literature. © 2020 Elsevier B.V.

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