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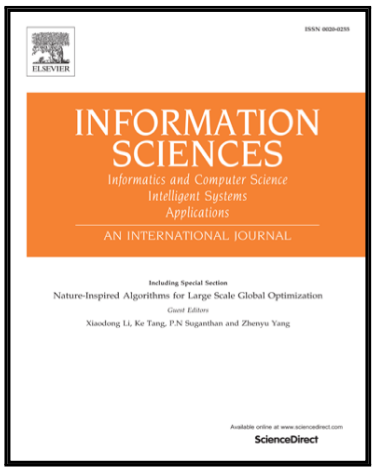

Context-based prediction for road traffic state using trajectory pattern mining and recurrent convolutional neural networks

Jia Zhu, Changqin Huang , Min Yang, Gabriel Pui Cheong Fung

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Context-based prediction for road traffic state using trajectory pattern mining and recurrent convolutional neural networks

Jia Zhu[a,b], Changqin Huang[b,*], Min Yang[c], Gabriel Pui Cheong Fung[d]

[a]*School of Computer Science, South China Normal University, Guangzhou, China*
[b]*Guangdong Engineering Research Center for Smart Learning, South China Normal University, Guangzhou, China*
[c]*Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China*
[d]*Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong, Hong Kong, China*

Abstract

With the broad adoption of the global positioning system-enabled devices, the massive amount of trajectory data is generated every day, which results in meaningful traffic patterns. This study aims to predict the future state of road traffic instead of merely showing the current traffic condition. First, we use a clustering method to group similar trajectories of a particular period together to get a cluster for each road. Second, for each cluster, we average the lengths and angles of the entire trajectories in the group as the representative trajectory, which is regarded as the road pattern. Third, we create a feature vector for each road based on its historical traffic conditions and neighbor road patterns. Finally, we design a recurrent convolutional neural network for modeling the complex nonlinear relationship among features for predicting road traffic conditions. Experimental results show that our approach performs more favorably compared with several traditional machine learning and state-of-the-art algorithms.

Keywords: Recurrent convolutional neural networks, Traffic state prediction, Trajectory pattern mining, Context-based concept, Deep learning.

*Corresponding author.
Email address: cqhuang@scnu.edu.cn (Changqin Huang)

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