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An Improved Convolution Deep Learning Model for Predicting Trip Mode Scheduling

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Abstract : Trip mode selection is a behavioral characteristic of passengers with immense importance for travel demand analysis, transportation planning, and traffic management. Identification of trip mode distribution will allow transportation authorities to adopt appropriate strategies to reduce travel time, traffic and air pollution. The majority of existing trip mode inference models operate based on human selected features and traditional machine learning algorithms. However, human selected features are sensitive to changes in traffic and environmental conditions and susceptible to personal biases, which can make them inefficient. One way to overcome these problems is to use neural networks capable of extracting high-level features from raw input. In this study, the convolutional neural network (CNN) architecture is used to predict the trip mode distribution based on raw GPS trajectory data. The key innovation of this paper is the design of the layout of the input layer of CNN as well as normalization operation, in a way that is not only compatible with the CNN architecture but can also represent the fundamental features of motion including speed, acceleration, jerk, and Bearing rate. The highest prediction accuracy achieved with the proposed configuration for the convolutional neural network with batch normalization is 85.26%.

Keywords : predicting, deep learning, neural network, urban trip
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