Transportation Mode Classification Using GPS Coordinates and Recurrent Neural Networks

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Abstract : The rising threat of climate change has led to an increase in public awareness and care about our collective and individual environmental impact. A key component of this impact is our use of cars and other polluting forms of transportation, but it is often difficult for an individual to know how severe this impact is. While there are applications that offer this feedback, they require manual entry of what transportation mode was used for a given trip, which can be burdensome. In order to alleviate this shortcoming, a data from the 2016 TRIPlab datasets has been used to train a variety of machine learning models to automatically recognize the mode of transportation. The accuracy of 89.6% is achieved using single deep neural network model with Gated Recurrent Unit (GRU) architecture applied directly to trip data points over 4 primary classes, namely walking, public transit, car, and bike. These results are comparable in accuracy to results achieved by others using ensemble methods and require far less computation when classifying new trips. The lack of trip context data, e.g., bus routes, bike paths, etc., and the need for only a single set of weights make this an appropriate methodology for applications hoping to reach a broad demographic and have responsive feedback.

Keywords : classification, gated recurrent unit, recurrent neural network, transportation
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