Título: Location Prediction from External Sensor Trajectories

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Resumo:

This thesis proposes a multi-task deep learning-based scheme to predict the next location from trajectories captured by external sensors (eg traffic surveillance cameras or speed cameras). The positions reported in these trajectories are sparse, due to the distribution of the sensors, and incomplete because the sensors can fail to register the passage of objects. This framework includes different pre-processing steps to align the representation of trajectories and deal with the problem of missing data. We present a multitasking learning approach based on recurrent

neural networks. This approach uses time and space information in the training phase to learn more meaningful representations. The multi-task learning model jointly with the pre-processing step substantially improves the prediction performance. This thesis also deals with the problem of representation learning for trajectory data. Representation learning concerns the problem of learning low-dimensional representation from complex data, and it is an essential task in machine learning. We evaluate how natural language processing models capture the representation of sensors and trajectories. The empirical evaluation shows that the space of features identified by such models can capture the spatial similarity relationships for sensors and trajectories within a given neighborhood. We also evaluate how these representations improve a location prediction model.

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