THE UNIVERSITY OF CHICAGO | DEPARTMENT OF STATISTICS

Master's Thesis Presentation

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"Minimizing Empty Truck Miles Driven via Decision-Theoretic Online Learning and Link Prediction on a Temporal Transportation Graph "

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Abstract

Reducing the total miles driven by unloaded trucks is a critical challenge in the transportation industry with significant economic and environmental implications. This paper frames the issue as a statistical decision problem in an online setting, where a driver who has just completed a delivery must decide whether to wait at the current location for a new order or return to the starting point.

The study presents a link prediction algorithm applied to a time-varying transportation demand graph, utilizing Temporal Random Walks within the Node2Vec embedding framework. Then, it assesses the performance of the Hedge Algorithm based on predicted probabilities of new edges to neighboring nodes generated by both the proposed prediction algorithm and traditional static graph link prediction algorithms. The study demonstrates the proposed algorithm's advantage by achieving sublinear regret.

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