



Thesis Defense

Computer Science Master's Program

“An Evaluation of Road Network Structure as a Predictor of Traffic Volume”

By Colin McDonald

Abstract:

This thesis evaluates the relationships between various graph theory metrics and taxi traffic volume for the cities of San Francisco, California and Porto, Portugal. We also evaluate a modified betweenness centrality metric which incorporates the count of distinct origin-destination pairs from the taxi data as the weight function. This is also a methodological improvement on a paper by Pengyao Ye, Bo Wu, and Wenbo Fan, because it reduces the circularity by temporally splitting the data into training and testing sets. We found that past traffic volume is almost perfectly correlated with future traffic volume and that the raw origin-destination counts actually have a higher correlation with edge-wise traffic than the modified betweenness centrality metric which incorporates that data. These results suggest traffic patterns are highly temporally consistent, that degree centrality, closeness centrality, and betweenness centrality poorly correlate with traffic volume, and that the incorporation of street network structure into historical origin-destination traffic data actually reduces the predictive power of the data.

Date: Thursday, June 11th, 2026

Time: 8:00 AM – 10:00 AM

Zoom Link: <https://calpoly.zoom.us/j/86530112782>

Committee: Dr. Theresa Migler, Dr. Daniel Frishberg, Dr. Paul Anderson

