

## COMPARISON OF ADJACENCY AND DISTANCE-BASED APPROACHES FOR SPATIAL ANALYSIS OF MULTIMODAL TRAFFIC CRASH DATA

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### ABSTRACT:

Many studies have utilized the spatial correlations among traffic crash data to develop crash prediction models with the aim to investigate the influential factors or predict crash counts at different sites. The spatial correlation have been observed to account for heterogeneity in different forms of weight matrices which improves the estimation performance of models. But very rarely have the weight matrices been compared for the prediction accuracy for estimation of crash counts. This study was targeted at the comparison of two different approaches for modelling the spatial correlations among crash data at macro-level (County). Multivariate Full Bayesian crash prediction models were developed using Decay-50 (distance-based) and Queen-1 (adjacency-based) weight matrices for simultaneous estimation crash counts of four different modes: vehicle, motorcycle, bike, and pedestrian. The goodness-of-fit and different criteria for accuracy at prediction of crash count revealed the superiority of Decay-50 over Queen-1. Decay-50 was essentially different from Queen-1 with the selection of neighbors and more robust spatial weight structure which rendered the flexibility to accommodate the spatially correlated crash data. The consistently better performance of Decay-50 at prediction accuracy further bolstered its superiority. Although the data collection efforts to gather centroid distance among counties for Decay-50 may appear to be a downside, but the model has a significant edge to fit the crash data without losing the simplicity of computation of estimated crash count.

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