

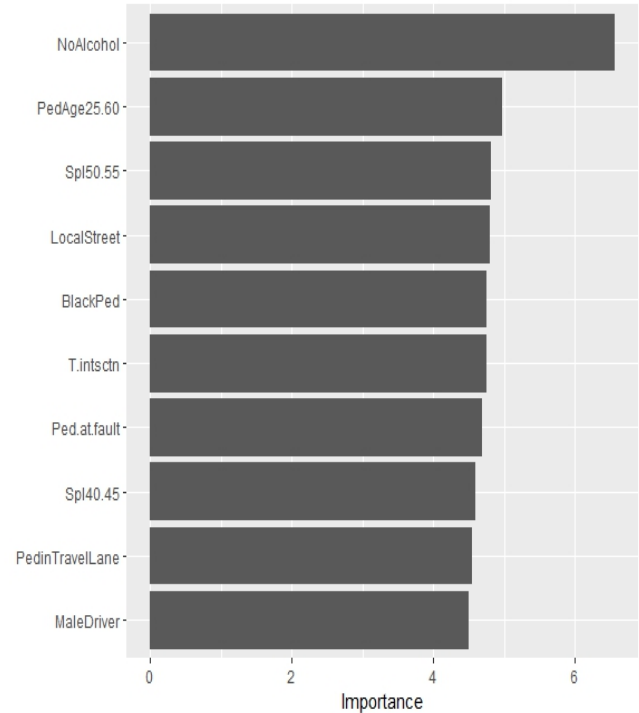
Applying AI to data sources to improve driver-pedestrian interactions at intersections

Tragically, roadway crossings sometimes act as killing fields, especially for pedestrian-vehicle collisions; intersections account for 40% of transportation crashes in the United States. To mitigate such incidents, pedestrian safety at intersections must be addressed effectively.

Chapter 2 incorporates pedestrian safety into the optimization of traffic signals by collecting and linking data from traffic signal cameras and analyzing the behaviors of pedestrians and drivers at intersections using artificial intelligence techniques (i.e., a decentralized Dyna Q-Learning environment). The results indicate that AI agents may safely prioritize pedestrian service even with longer wait times or reduce pedestrian delays at the expense of vehicle delay performance.

Chapter 3 explores rare pedestrian crashes at intersections, called “corner cases,” using Fatality Analysis Reporting System (FARS) data and applying text analytics and the K-means unsupervised learning approach. Such crashes are likely to be triggered by a combination of factors, including poor visibility, severe weather, impaired pedestrian or driver behaviors, and dark lighting conditions.

Chapter 4 investigates the determinants of nighttime pedestrian crash injury severity in pedestrian-involved crashes on intersections using the random forest algorithm and ordered logit models. The analysis reveals that alcohol impairment, foggy weather, elderly pedestrians, a speed limit of 50-55 mph, and motorists not yielding to pedestrians are more likely to contribute to severe pedestrian injuries at intersections.



Relative importance of the 10 most influential predictors of pedestrian crashes at intersections

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