Research Notes

DRISI

Caltrans Division of Research, Innovation and System Information

Transportation Safety and Mobility

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Project Title:
Strategies for Reducing Pedastrian and Bicyclist Injuries at the Corridor Level

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Development of Active Transportation Safety Performance Functions in California

Develop or calibrate the Safety Performance Functions (SPFs) for enhancement of active transportation safety in California.

WHAT IS THE NEED?

Non-motorists are defined as road users not in or upon a motor vehicle and generally consist of walking pedestrians, bicyclists, individuals in wheelchairs or motorized personal conveyances, skateboarders, and others. They are a vulnerable segment of the traveling public due to the lack of a protective structure and difference in body mass between them and motor vehicles, which renders them prone to heightened injury susceptibility in case of a collision. On the other hand, active transportation provides enormous benefits for addressing the issues of congestion, health, and environment. Therefore, encouraging individuals to indulge in active transportation, involving walking and bicycling, brings with it a societal obligation to protect commuters as they engage in these modes of travel.

One of the most popular methods is to develop the safety performance functions (SPFs) as adopted by the Highway Safety Manual, which also has other three major components including crash modification factors (CMFs), calibration factors, and crash proportions.

WHAT ARE WE DOING?

The proposed study consists of the following main activities:
- Determine the base conditions of SPFs based on the main design features of roadways, the resultant data sample size and variable selection features associated with decision tree-based methods.

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- Develop the basic SPFs and CMFs using typical regression methods which can satisfy the engineering need such as benefit to cost ratio analysis for active transportation related infrastructure.
- Develop the enhanced SPFs and CMFs using more sophisticated statistical models for verification and comparison purpose.
- Evaluate the developed SPFs and CMFs from different perspectives.

WHAT IS OUR GOAL?

To increase the accuracy of the results from the HSM procedures, states have been encouraged to customize the procedures using local data. However, there is still lack of accurate active transportation-related SPFs developed or calibrated using local data. Therefore, the goal of the project is to develop or calibrate the SPFs for enhancement of active transportation safety in California.

WHAT IS THE BENEFIT?

The proposed study will be expected to generate the following benefits:

- Yield more accurate SPFs and CMFs related with active transportation-related accidents, which help Caltrans direct the limited budget to most needed improvement areas of active-transportation infrastructure.
- Assist Caltrans in satisfying the goal to enhance active transportation activities while committing to Vision Zero
- Shed extensive light on the understanding of the impact of various factors to activity transportation for traffic safety practitioners.
- Raise awareness of safety among general public with more information about activity transportation safety issues.
- Contribute to the traffic safety community with insightful findings associated with active transportation which should draw extensive practical and research interests.

WHAT IS THE PROGRESS TO DATE?

During this quarter, the following activity was completed:

- Developed a type 2 SPF for both vehicles and pedestrians, jointly based on all 6,000 intersections using the following procedure:
  1. Determined the importance ranking based on the random forest method.
  2. Conducted correlation analysis for all numerical variables.
  3. Used the negative Binomial method during the first round and second round of variable screening
  4. Prepared final results