Pedestrians Under Influence: Findings from Correspondence Regression Analysis

Subasish Das, Ph.D. Associate Transportation Researcher, Texas A&M Transportation Institute (s-das@tti.tamu.edu)
Sruthi Ashraf, Research Assistant, Texas A&M Transportation Institute (s-ashraf@tti.tamu.edu)
Anandi Dutta, Ph.D. Senior Lecturer, Ohio State University (dutta.34@osu.edu)
Ly-Na Tran, Student Assistant, Texas A&M University (lynattran22@tamu.edu)

Research conducted by

Texas A&M Transportation Institute | The Texas A&M University System | The Ohio State University College of Engineering

Abstract

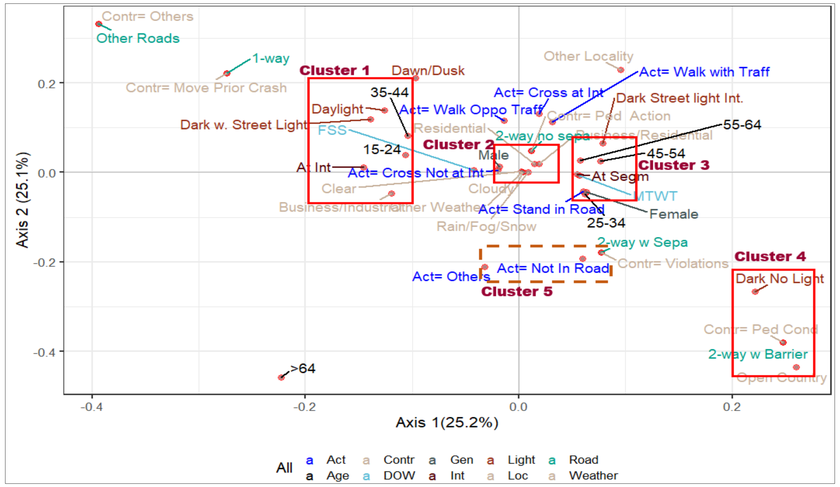
- Traditional safety analysis methods do not include human factors.
- Fatalities involving pedestrians under influence (PUI) of drugs or alcohol are increasing significantly.
- Collected parish wise crash data (2010–2016) from Louisiana Department of Transportation and Development (LADOTD).
- Used cluster correspondence analysis (CCA) to determine the contributing factors and association patterns.

Methodology

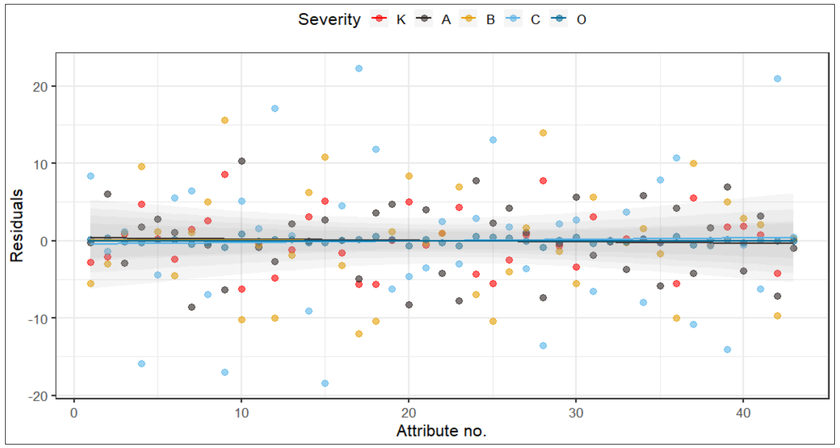
- From the total crash data, 1231 PUI crashes were identified and classified based on severity.
- Conducted preliminary exploratory analysis to examine the significant factors that may contribute to crash occurrence.
- The final dataset contained 9 variables classified to 43 attributes. Created association graphs.
- Applied CCA to identify the key association patterns.
- The analysis in this paper is undertaken at the level of pedestrians involved in a crash.

Why CCA?

- Useful in analyzing the effects for a polytomous or multinomial outcome.
- On the basis of Eigen Values, the association between response and explanatory variables are established.



Biplot of exploratory variables



Residual plots by attributes

Key Clusters and Attributes

- **Cluster 1:** Daylight, dark with street lighting, two age groups (15–24, and 35–44), pedestrian location at the intersection, and business/industrial locality.
- **Cluster 2:** 2-way roadways with no separation, residential and business/residential locality, male pedestrian, all weather conditions, pedestrian crossing at non-intersections, and pedestrian action.
- **Cluster 3:** 2-way roadways with no separation, three age groups (25–34, 45–54, and 55–64 years), female pedestrians, pedestrian's location at the segment, weekdays (MTWT), dark with street light at an intersection only, and pedestrian standing on roadways.
- **Cluster 4:** 2-way roadways with a barrier, dark conditions with no lighting, pedestrian action as a contributing factor, and open country locality.
- **Cluster 5:** 2-way roadways with physical separation, actions as pedestrian not in road and others, and pedestrian violations.

Conclusions

- Among PUI, females are more likely to be involved in intersection crashes, while males are more likely to be involved in midblock crashes.
- For every severity level, a greater percentage of PUI crashes took place on the weekend (i.e., Friday, Saturday, and Sunday) than during weekdays.
- Roadway features like dark with no light, two-lane roadway with no physical separation are highly associated with PUI crashes.
- Fatal PUI crashes are more associated with roadways with no lighting at night.
- Suitable countermeasures include pedestrian-friendly intersection design, increasing pedestrian crossing phasing during the weekends at night, and encouraging ridesharing during weekends.