Vehicle Crash Severity Correlating Factors

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Abstract

This is where the abstract should go.

Keywords: Highway Safety Analysis Crash Severity Statistical Correlation

1. QUESTIONS

Research in network screening for highway safety analysis is continually developing and improving as data processing technologies and understanding of crash data improve. However, a major difficulty with most current network screening methodologies is that they do not account for the influence of crash severity towards the overall potential for safety improvement (PSI) of roadways. Therefore, it is valuable to use a crash severity-weighted approach when performing network screening. Yasmin and Eluru (2018) and Afghari et al. (2020) assert that a joint crash count with crash severity model is best suited to identify sites with the most PSI because of the correlation between crash counts and crash severity. In addition to this joint model, it may be helpful to consider other factors which may contribute to the crash severity distribution at a given site. Ghadi and Árpád Török (2020) attempted to determine the impact of spatial and environmental factors on crash severity, but few others have added to this research.

The purpose of this article is to identify any additional factors that may correlate to crash severity such as the manner of collision, the presence of pedestrians, the light conditions, and so on. The results of this article will help determine which of these factors are significant enough to include in severity-weighted network screening. In the past, many network screening models have been limited by precedent, but this research aims to expound on and improve these tried and tested methods. With better understanding of how crash factors relate to crash severity, it may be possible to more proactively prevent severe crashes rather than waiting for them to happen before they can be modeled.

2. METHODS

In this chapter, you describe the approach you have taken on the problem. This usually involves a discussion about both the data you used and the models you applied.

2.1. Data

Discuss where you got your data, how you cleaned it, any assumptions you made.

Often there will be a table describing summary statistics of your dataset. Table 1 shows a nice table using the `datasummary` functions in the `modelsummary` package.

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Table 1: Descriptive Statistics of Dataset

		regcar (N=10930)		sportuv (N=1048)		sportcar (N=880)		stwagon (N=4446)		truck (N=5628)	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. De
price		4.2	1.9	4.7	1.9	4.8	2.2	4.1	1.9	4.2	2.
range		237.2	94.5	241.6	94.7	233.6	96.7	238.7	94.3	238.2	93.
size		2.4	0.8	2.1	1.0	1.4	1.0	2.3	0.8	2.4	0.
		N	Pct.	N	Pct.	N	Pct.	N	Pct.	N	Pc
fuel	gasoline	2704	24.7	280	26.7	218	24.8	1096	24.7	1413	25.
	methanol	2729	25.0	246	23.5	225	25.6	1091	24.5	1445	25.
	cng	2767	25.3	260	24.8	238	27.0	1109	24.9	1360	24.
	electric	2730	25.0	262	25.0	199	22.6	1150	25.9	1410	25.

2.2. Models

If your work is mostly a new model, you probably will have introduced some details in the literature review. But this is where you describe the mathematical construction of your model, the variables it uses, and other things. Some methods are so common (linear regression) that it is unnecessary to explore them in detail. But others will need to be described, often with mathematics. For example, the probability of a multinomial logit model is

$$P_i(X_{in}) = \frac{e^{X_{in}\beta_i}}{\sum_{j \in J} e^{X_{jn}\beta_j}} \tag{1}$$

Use LaTeX mathematics. You'll want to number display equations so that you can refer to them later in the manuscript. Other simpler math can be described inline, like saying that $i, j \in J$. Details on using equations in bookdown are available here.

3. FINDINGS

This section might be called "Results" instead of "Applications," depending on what it is that you are working on. But you'll probably say something like "The initial model estimation results are given in Table **??**." That table is created with the `modelsummary()` package and function.

With those results presented, you can go into a discussion of what they mean. first, discuss the actual results that are shown in the table, and then any interesting or unintuitive observations.

3.1. Additional Analysis

Usually, it is good to use your model for something.

- Hypothetical policy analysis
- Statistical validation effort
- Equity or impact analysis

If the analysis is substantial, it might become its own top-level section.

References

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