

Holiday Driving Safety: Holiday Safety Rank

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Abstract

Holiday travel often results in new traffic patterns, with drivers following routes they might not be very familiar with. Analyzing over 200,000 December accidents from 2016-2018, we asked where the most accidents occur during this busy season. The most accidents occurred in Houston, followed by Dallas, Charlotte, Austin, L.A., Atlanta, Raleigh, Miami, Oklahoma City and Seattle in the top 10. In each city we have identified a “Go Safety Hotspot” or specific area to avoid and ensure you and your loved ones are safe this holiday season.

1 Introduction

Holiday travel often results in new traffic patterns, with drivers following routes they might not be very familiar with. Analyzing over 200,000 December accidents from 2016-2018, we asked where the most accidents occur during this busy season. The most accidents occurred in Houston, followed by Dallas, Charlotte, Austin, L.A., Atlanta, Raleigh, Miami, Oklahoma City and Seattle in the top 10. While Atlanta and Miami combined had 2/3rds the amount of total accidents that Houston experienced during December, both cities had 4 of the top 10 crash ‘hotspots’. Los Angeles and Houston each had one accident hotspot in the top 10. Interestingly, many of these hotspots are interchanges or similar road junctions where different highways meet and exchange drivers. We find the top December ‘Go safety Hotspot’ in each of the top 10 cities. We suggest long haul holiday drivers use extra vigilance navigating unfamiliar interchanges during the busy and hectic holiday season.

2 Methodology

This report draws on data collected by Ph.D. candidate Sobhan Moosavi and colleagues in the Rajiv Ramnath lab at The Ohio State University’s Department of Computer Science & Engineering [1][2][3]. Briefly, across the contiguous US, 2.2M accidents were recorded from the Bing or Mapquest APIs, along with concurrent weather information. Note that data is not equally distributed across the US, with larger states (TX, CA, FL, NY) generating a substantial fraction of the data [4].

To find traffic patterns for holiday travel, we isolated 201,348 accidents that occurred during the month of December available in the dataset. We then subset by city code and found the 10 highest accident counts by city during December. To find accident hotspots, we subset by latitude/longitude pair for the top 10 cities and found the 10 highest accident count ‘hotspots’ during December.

3 Holiday Safety Ranking

Top 10 “Go Safety Hotspots” in each city can be found below. Number of estimated people involved in accident calculated according to government determined average vehicle occupancy rates [6] of 1.59, and conservatively assumes two cars are involved in each accident.

Go Hot Spot Rank	City	Accidents	Approx People Involved	Latitude	Longitude	Plain Text Location Name
1	Atlanta	52	165	33.744976	-84.390343	I20/I75/I85 Interchange; "Downtown Connector"
2	Miami	50	159	25.789072	-80.204353	I95/I395 Interchange; "Midtown Interchange"
3	Los Angeles	27	86	34.038456	-118.27401	I10/I110 Interchange
4	Houston	26	83	29.808233	-95.336021	I69/I610 Interchange
5	Raleigh	26	83	35.766506	-78.735367	I40/I440 Interchange
6	Austin	25	80	30.190359	-97.770462	I35 at William Cannon Dr
7	Dallas	24	76	32.923908	-96.764305	TX75/I635 Interchange; "High Five Interchange"
8	Seattle	17	54	47.626503	-122.328613	I5/Mercer St Interchange; "Mercer Mess"
9	Charlotte	17	54	35.207024	-80.796341	74 Independence Blvd; "Briar Creek Road Connector"
10	Oklahoma City	13	41	35.557865	-97.638115	Northwest expressway at Rockwell Ave

4 Preliminary Conclusions

We find that the top 10 holiday accidents are, in order(with recorded counts in parentheses): Houston (7183 accidents), Dallas (4541, 63% of Houston), Charlotte (4477, 62%), Austin (4021, 56%), L.A. (3465, 48%), Atlanta (2951, 41%), Raleigh (2903, 40%), Miami (2453, 34%), Oklahoma City (2108, 29%), and Seattle (1834, 26%). As this was a broad based study, we did not correct for city area, population or vehicle miles traveled (VMT). Future studies will evaluate these metrics to correct for these parameters.

Similarly, reporting bias is inherent in this skewed distribution of accidents (see eg the state distribution provided at [4]). While some of the top cities were in the higher sampled states (CA ~22% of data, TX (~11%), FL (~8%)), we did not see NY cities in the top 10 (~5%) while we did see ones from similar or less represented states like NC (~5%), GA (~3%), WA (2%), and OK (~1.6%). More work is needed to account for reporting bias and adjust for other factors as discussed above.

Given this lopsided reporting skew, we were surprised to find two cities from the lower end of the top 10 (Miami, 1/3rd as many accidents as Houston; Atlanta, 2/5th as many accidents as Houston). One explanation may be that certain police or highway patrol record accident locations with different accuracy. Alternatively, the lack of hotspots in Houston may reflect a larger and more spread out city area. Indeed, Houston is known to be one of the largest and most sprawling and low density urban cities, consistent with a wider spread distribution of hotspots over denser urban cities (see e.g. “Houston and Harris County have well-deserved reputations for built environments that are spread out and low density.” Houston Chronicle Apr 18, 2017[5]). Further research is needed to untangle this observation.

Consistent with a more concentrated urban area generating accident hotspots at high traffic areas, we find that (many) of the top 10 hotspots occur at highway interchanges. Given that many holiday travel plans include specific long-distance routes traversing multiple highways, we suggest that these hotspots may be the result of holiday drivers unfamiliar with the confusing, spaghetti-like cloverleaf interchanges common to many US cities. Further research is needed to untangle complicating factors, such as traffic volume changes and weather conditions.

Exhibits A & B



Exhibit A

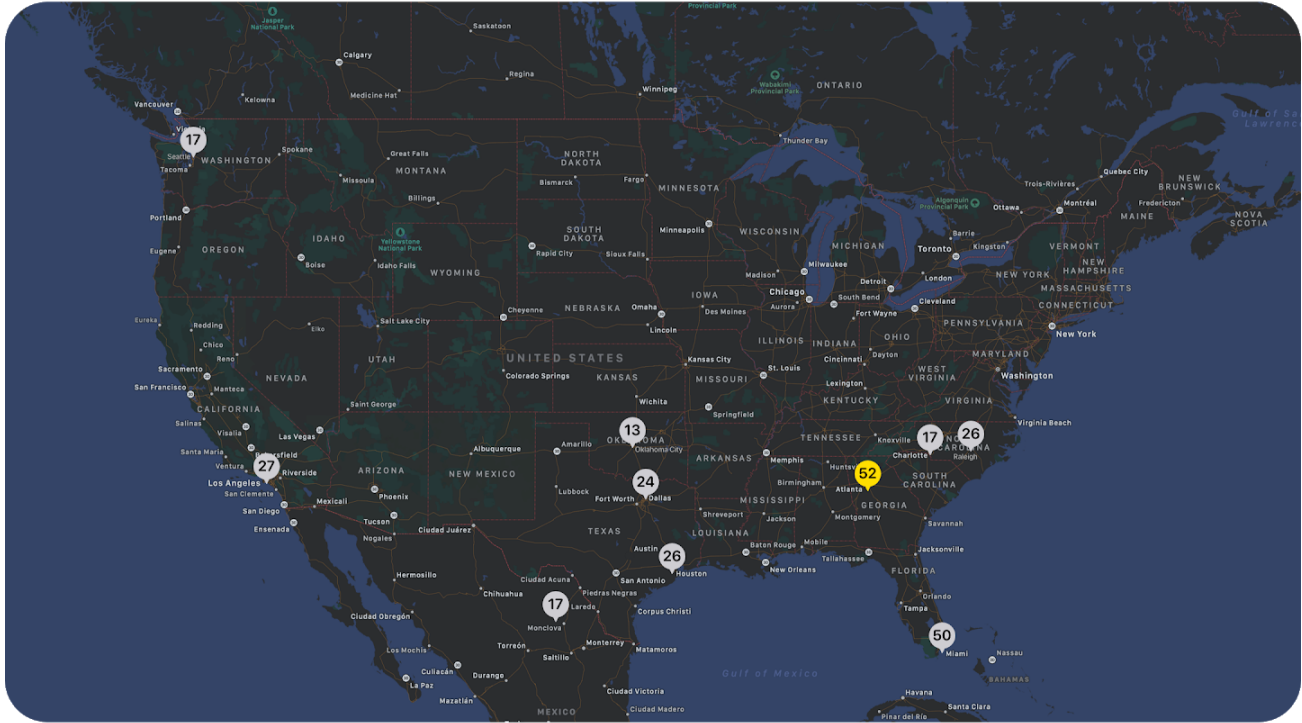


Exhibit B

References

- [1] Moosavi, Sobhan, Mohammad Hossein Samavatian, Srinivasan Parthasarathy, and Rajiv Ramnath. [“A Countrywide Traffic Accident Dataset.”](#) arXiv preprint arXiv:1906.05409 (2019).
- [2] Moosavi, Sobhan, Mohammad Hossein Samavatian, Srinivasan Parthasarathy, Radu Teodorescu, and Rajiv Ramnath. [“Accident Risk Prediction based on Heterogeneous Sparse Data: New Dataset and Insights.”](#) In proceedings of the 27th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems, ACM, 2019.
- [3] <https://cse.osu.edu/people/ramnath.6>
- [4] https://smoosavi.org/datasets/us_accidents
- [5] <https://www.houstonchronicle.com/local/gray-matters/article/Famous-for-sprawl-Houston-is-denser-than-you-11078173.php>
- [6] <https://www.energy.gov/eere/vehicles/fact-613-march-8-2010-vehicle-occupancy-rates>