

Predicting and Visualizing Traffic in Charlottesville



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Overview and Background

- Traffic and Accidents are an unpleasant reality that we all have to deal with
- More than the health and financial damages that accidents inflict, they create a loss of time due to traffic jams
- Especially on highways, users should have the ability to see existing traffic jams and the severity of the accidents to change plans if necessary



Dataset Background

- Countrywide car accident dataset that covers 49 states
- Data from 2016-2023
- Data collected from local and federal departments of transportation, law enforcement, and traffic cams
- 7.7 million accidents
 - ~900 accidents in Charlottesville



Project

Plan: Predicting and visualizing traffic in Charlottesville

- Can we predict the severity of an accident in the greater Charlottesville area to help users know the traffic impacts and adjust travel plans if necessary

Dataset: Accident information on the east coast (we are looking at specific information in the Charlottesville area)

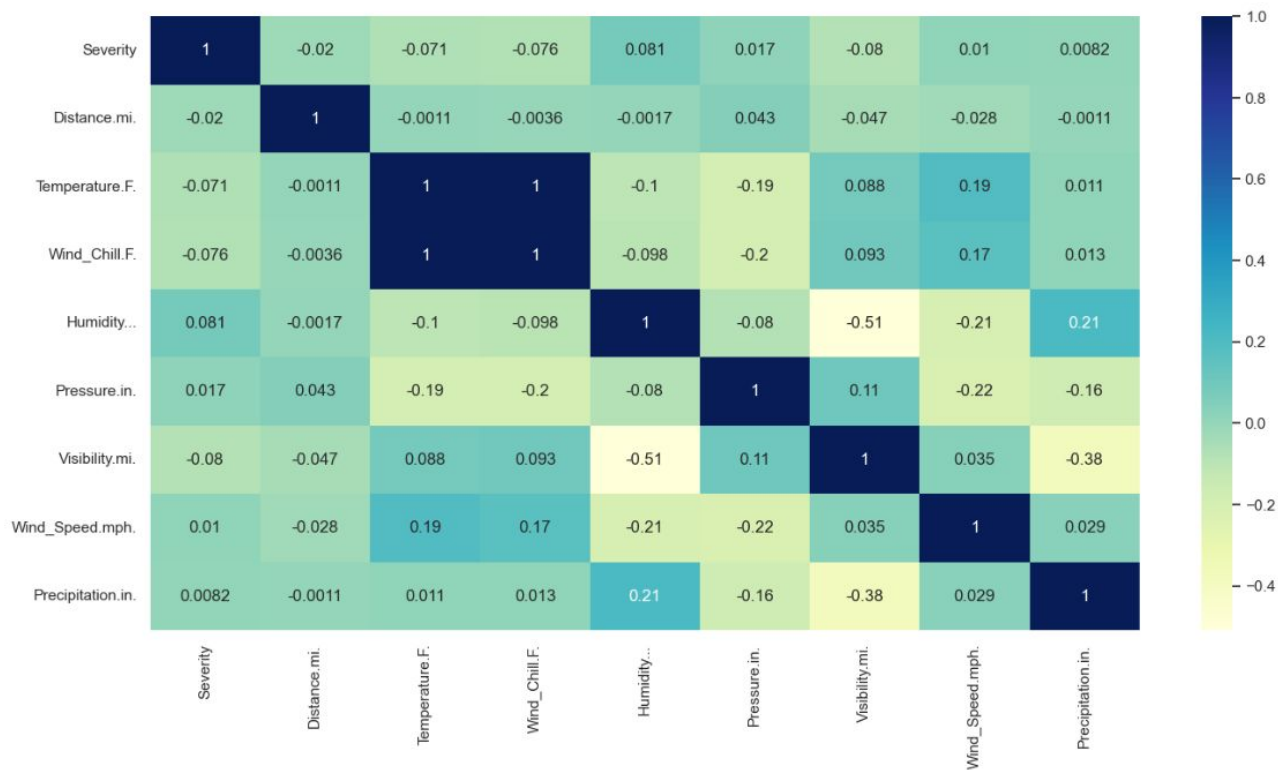
- Features include weather, accident location, and traffic jam information

Project Deliverables:

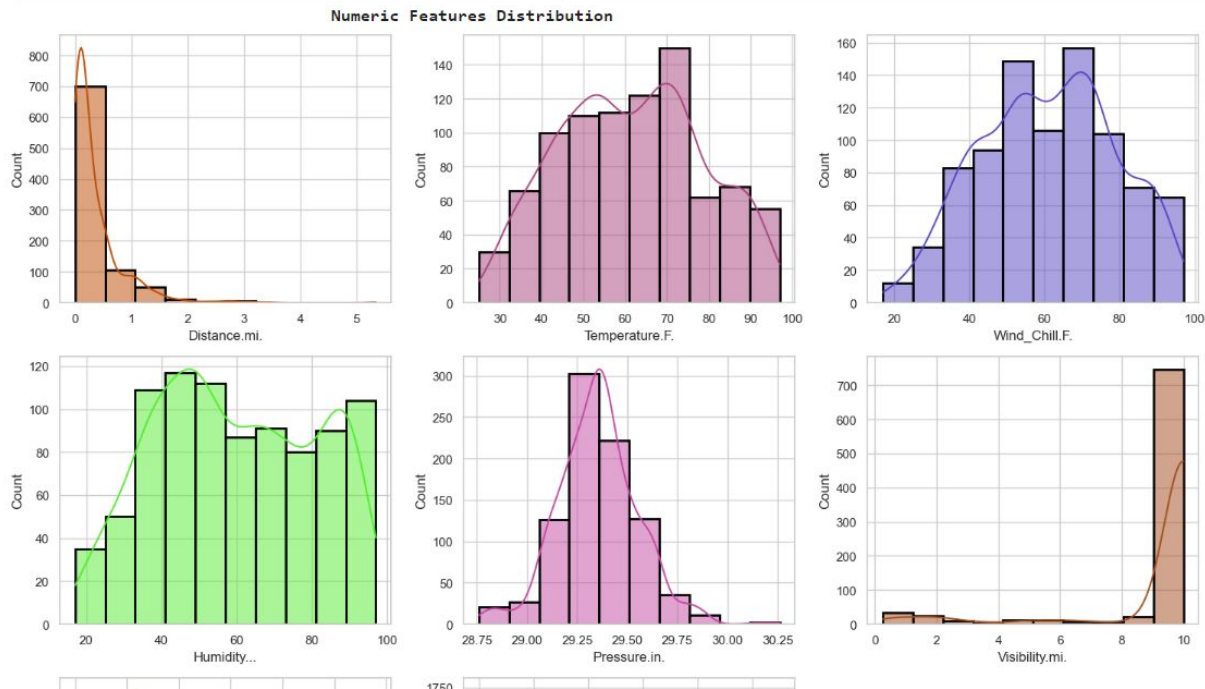
- Create an R shiny app that displays accident information in Charlottesville, allows widgets for filtering by weather, specific highway, etc.
- Create predictive model for severity of accident (XG Boost, RandomForest)
- Connect model to dashboard



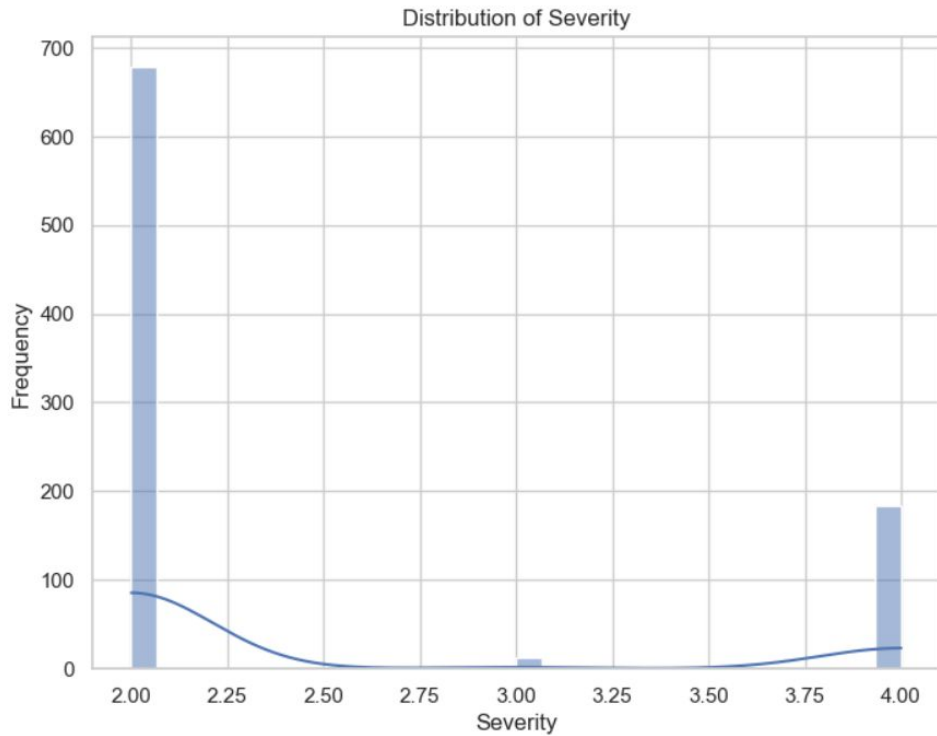
EDA



EDA Cont.



EDA Targeted



Preliminary Work

- Big Idea: Connect Model to Visual Dashboard

Random Forest Model

Upload CSV file

Browse... No file selected

Select Target Variable

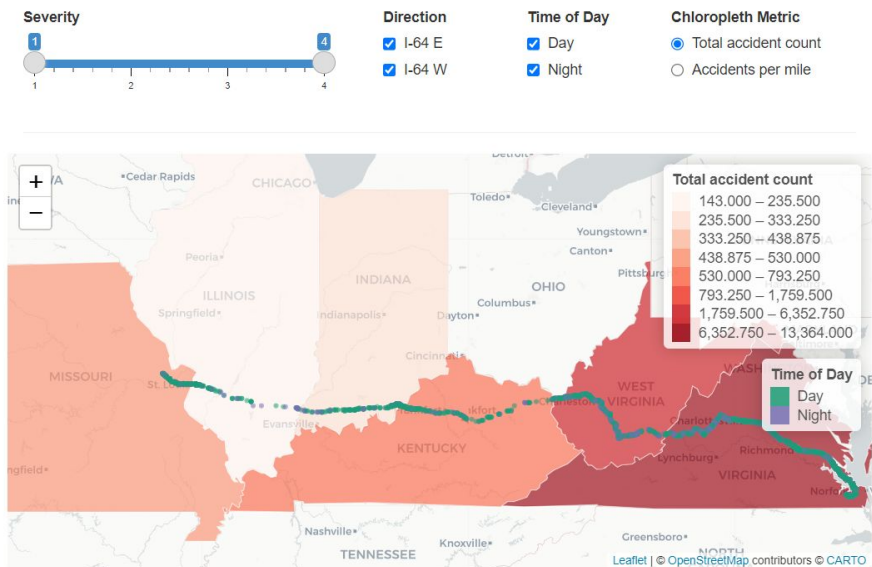
Select Feature 1

Select Feature 2

Select Feature 3

Run Model

Results Plots



Preliminary Work Cont.

Weather

Fair

Year

2018

2021

2018

2019

2020

2021

Traffic Hours

0

440

0

44

88

132

176

220

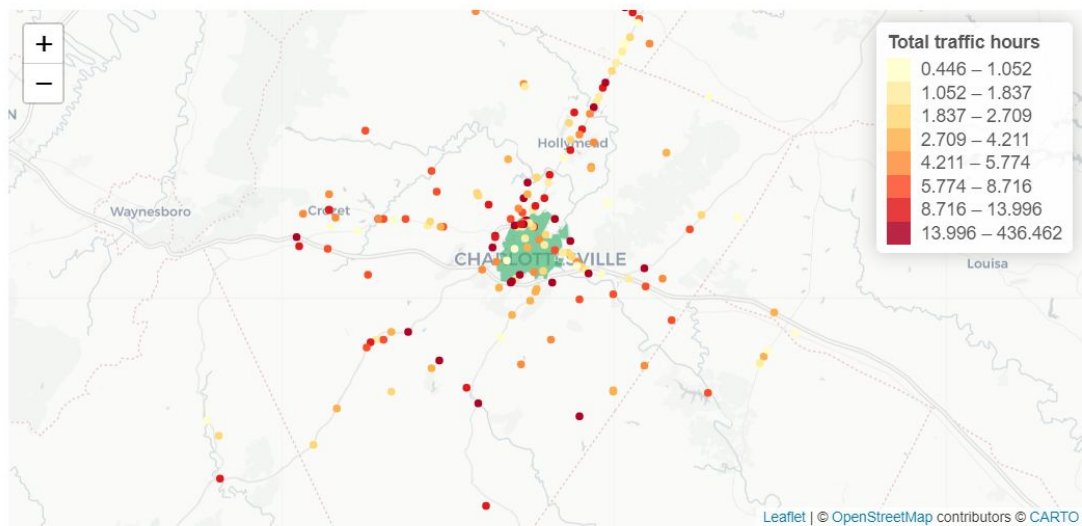
264

308

352

396

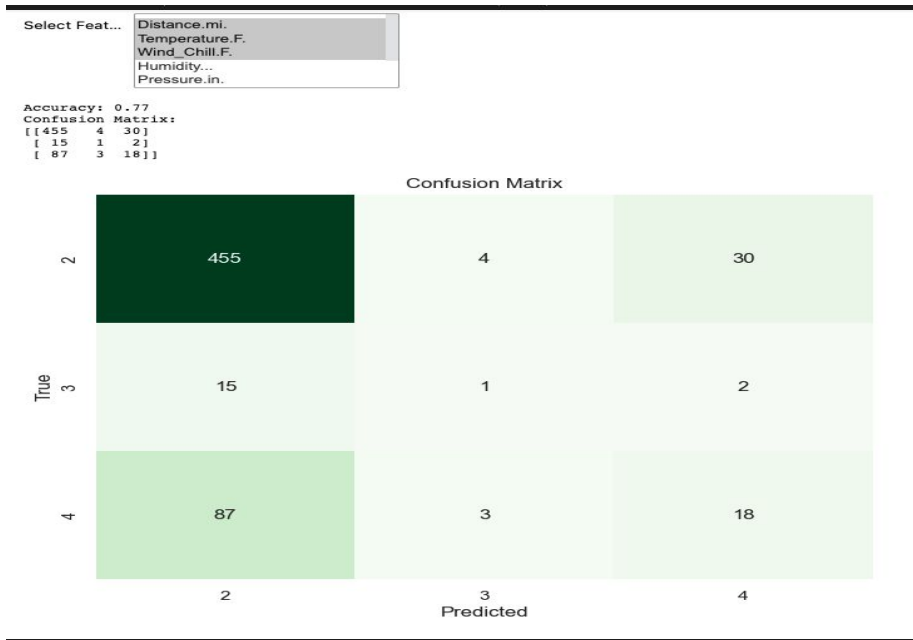
440



Initial Round of Feedback/Incorporation

- Accident cleanup time (kind of have in other features)
 - **Other Features Account for this**
- How we worked with skew in severity
 - **Classification instead of Regression**
- Who is app targeted to?
 - **Everyday users**
- Why these ML Models?
 - **RandomForest, KNN, XGBoost**

Demonstration of Apps and Model



https://amv7av.shinyapps.io/Traffic_Report/

Conclusion

- We were able to build interactive apps for the map and model for users
- We were able to identify trends in traffic and accident patterns in the greater Charlottesville Area
- We learned that data presentation is often just as important as creating an accurate model



Future Work

- Find a way to connect map data to Model - Adding Prediction labels for Each Accident on the Map
- Input more training data, with moderate accidents (more normal distribution)
- Create models for different areas of the country (west coast, east coast, southeast)

