Wrath of the Fujita

Final Project Presentation
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Introduction

No one can deny the raw power that mother nature is capable of producing. Especially when it stems from a wide, rapid, rotational display of temperature fluctuating air that is a tornado.

Our group was curious about how severe the repercussions actually are when it comes to tornados. We took a look at data and attempted to quantify the results, look for patterns and measure predictability.

Basic Definitions

Understanding tornado lingo

Tornado is “a violently rotating column of air, pendant from a cumuliform cloud or underneath a cumuliform cloud, and often (but not always) visible as a funnel cloud.”

Fujita scale - Fu·jita scale (noun) - The definition of the Fujita scale is a scale for rating tornado intensity, using the damage tornadoes inflict on human-built structures and vegetation to estimate wind speed and establish a rating.

Width - the measurements defined in our datasets are in **yards** and refers to how wide the tornado is from the ground.

Length **-** the measurements defined in our datasets are in **miles** and refers to the distance traveled.

Touchdownlat **-** The latitude at which the tornado touches the ground.

Touchdownlon **-** The longitude at which the tornado touches the ground.

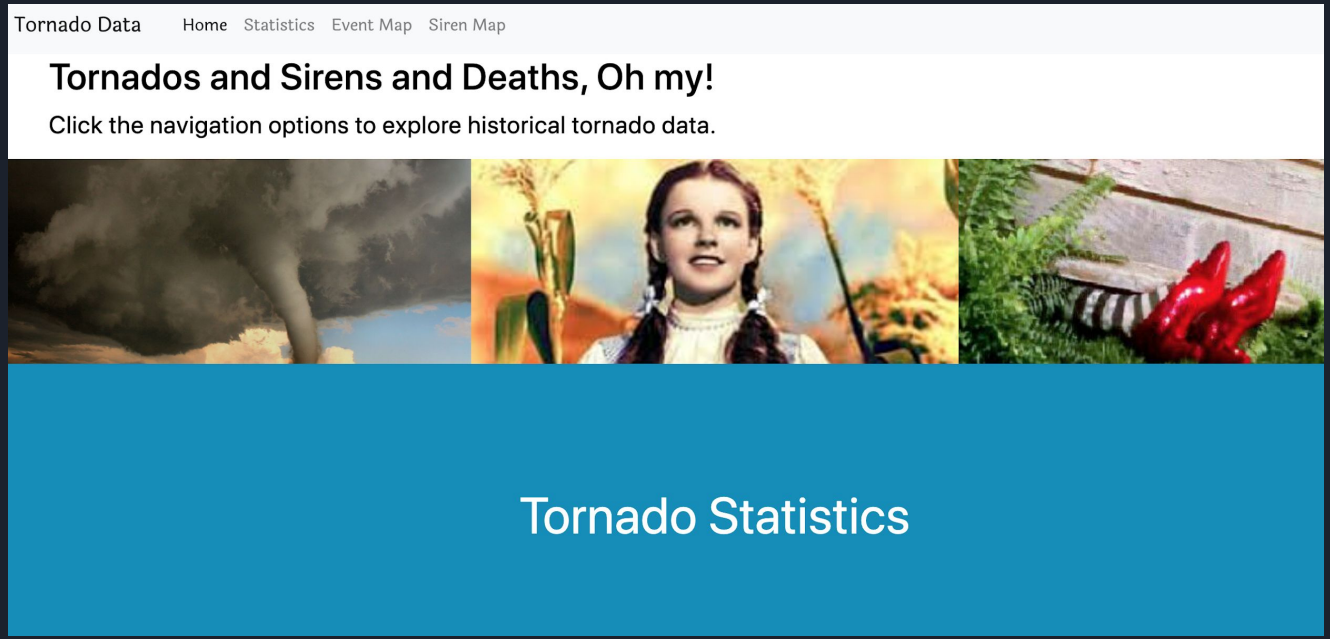
Liftofflat **-** The latitude at which the tornado lifts off the ground.

Liftofflon **-** The longitude at which the tornado lifts off the ground.

How we got here

In Project 2 we developed…

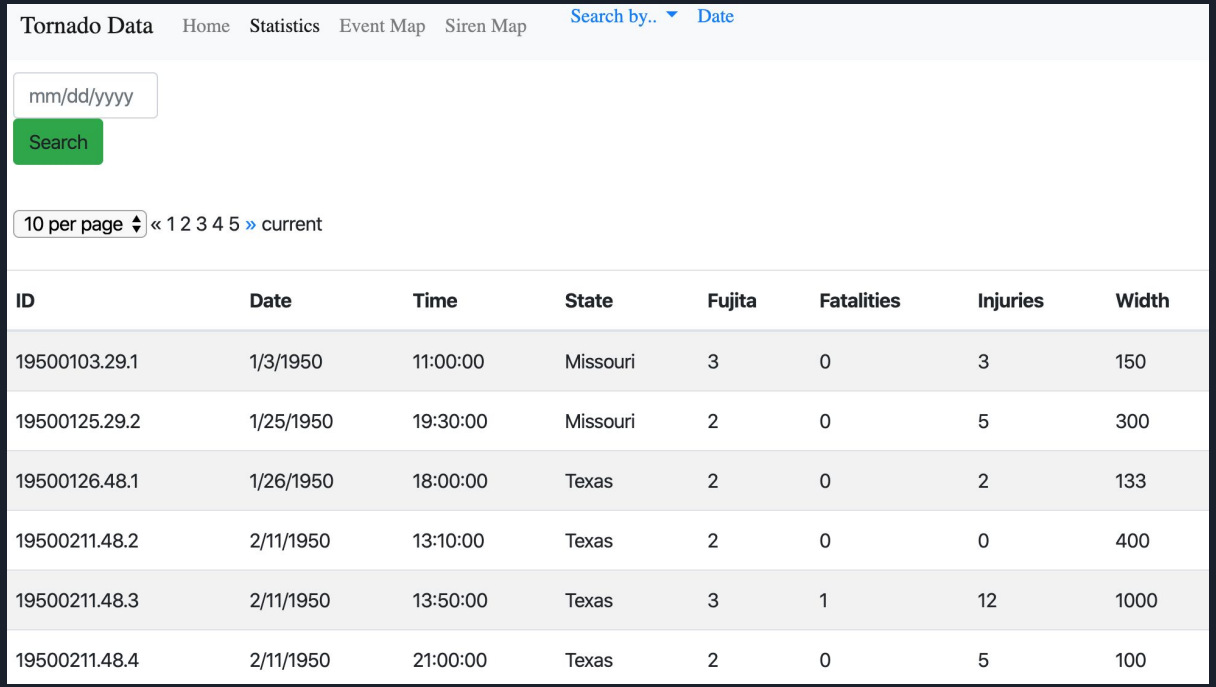
A website using Flask, HTML, JavaScript, CSS and SQLite



How we got here

The Project 2 website provided…

A way for users to explore the data.



ID	Date	Time	State	Fujita	Fatalities	Injuries	Width
19500103.29.1	1/3/1950	11:00:00	Missouri	3	0	3	150
19500125.29.2	1/25/1950	19:30:00	Missouri	2	0	5	300
19500126.48.1	1/26/1950	18:00:00	Texas	2	0	2	133
19500211.48.2	2/11/1950	13:10:00	Texas	2	0	0	400
19500211.48.3	2/11/1950	13:50:00	Texas	3	1	12	1000
19500211.48.4	2/11/1950	21:00:00	Texas	2	0	5	100

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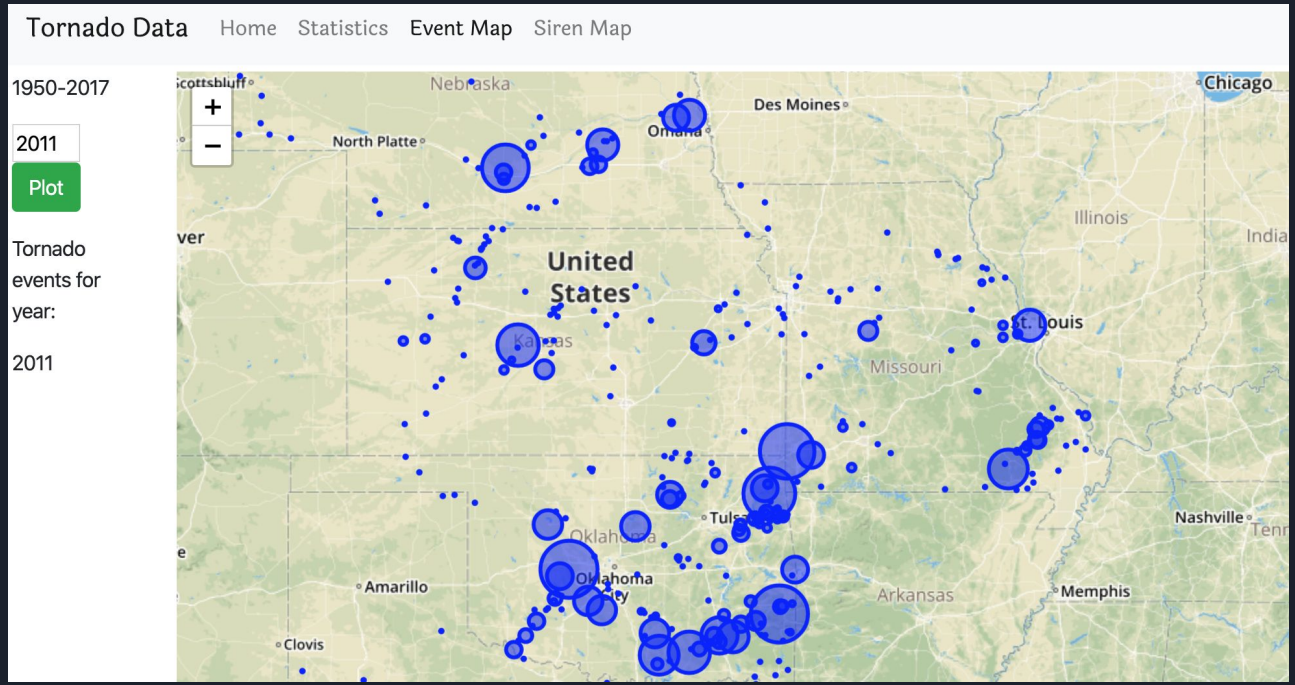

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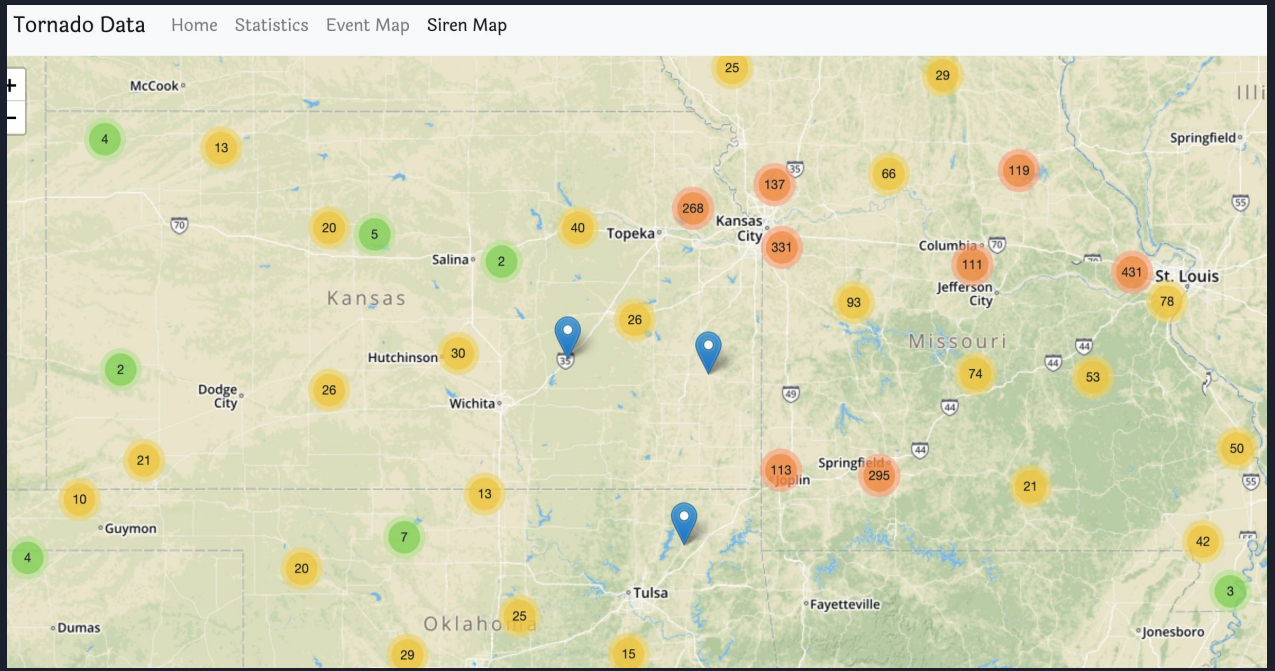


What's New in Project 3

Expanded the data to include all of the contiguous United States.

Eliminated to Siren Data from the analysis.

Employed Data Analytics tools to evaluate the data.

Jupyter Notebook	Python	Pandas
SQLite	Tableau	Machine Learning

Tableau
Visualizing Data

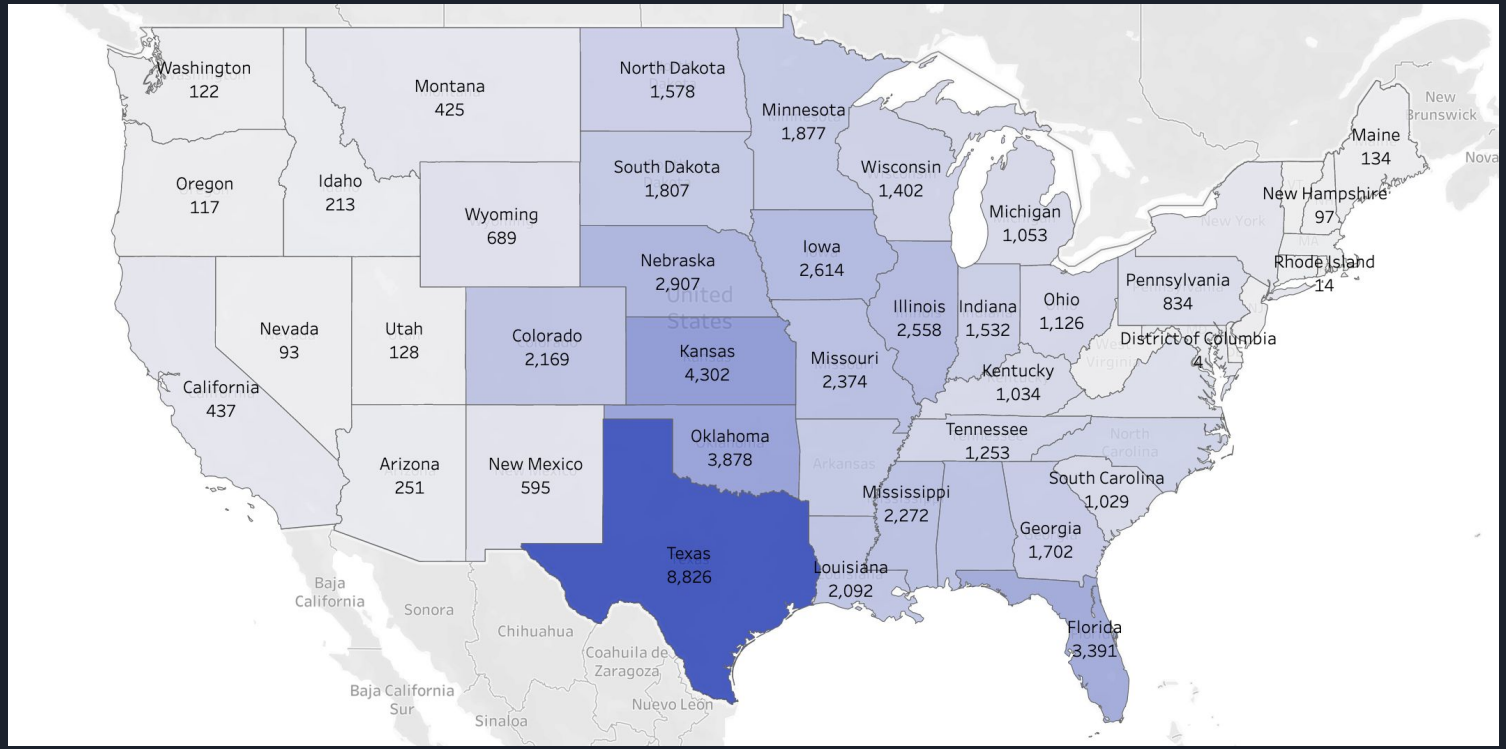
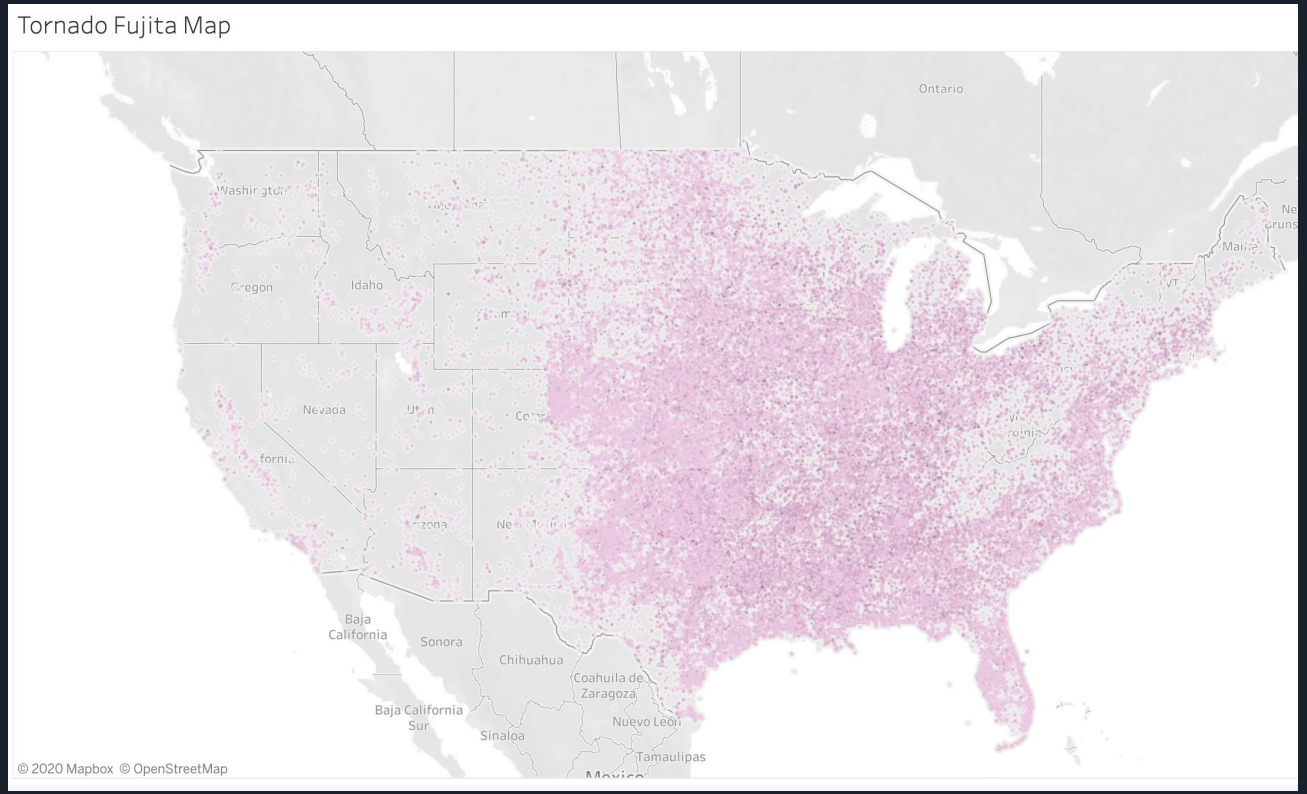


Tableau
Visualizing Data



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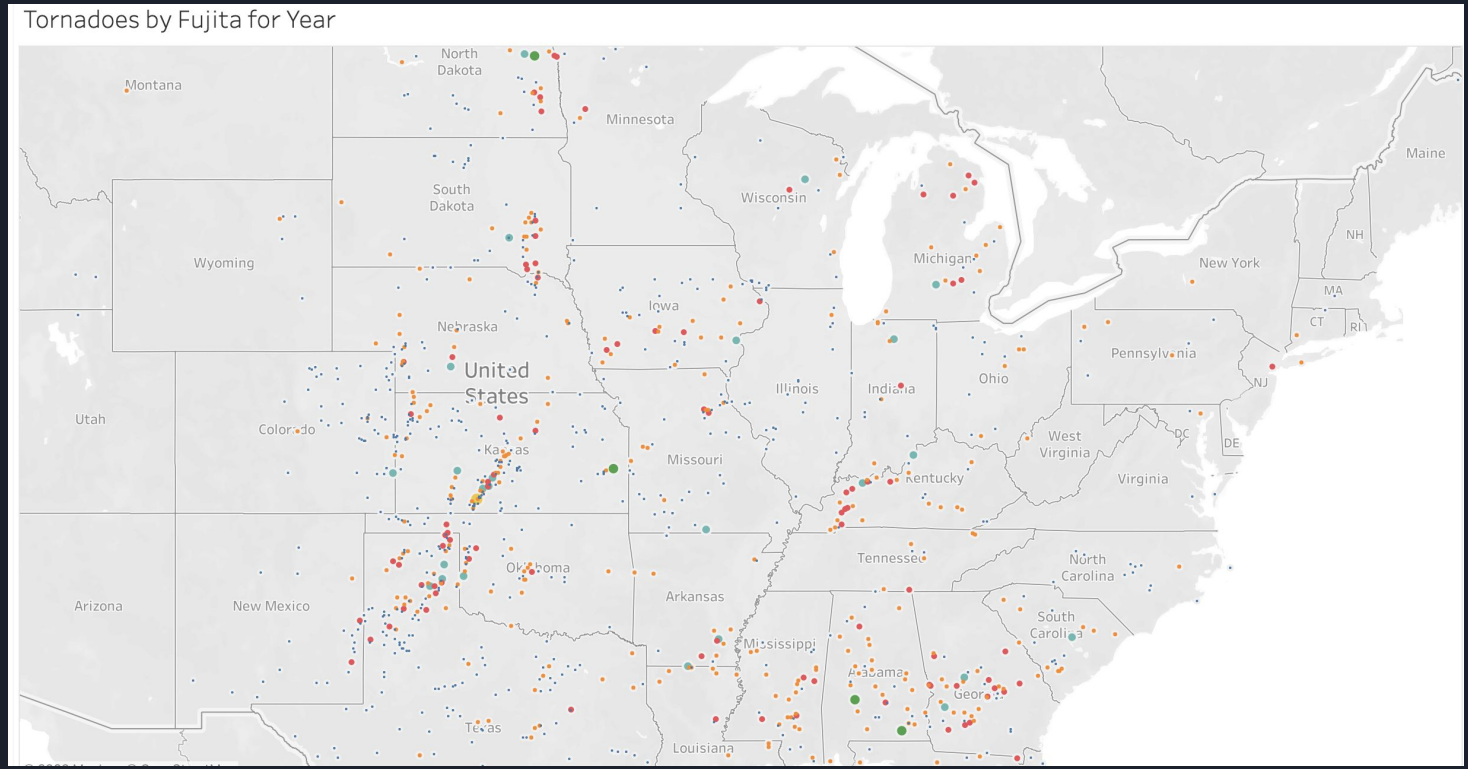

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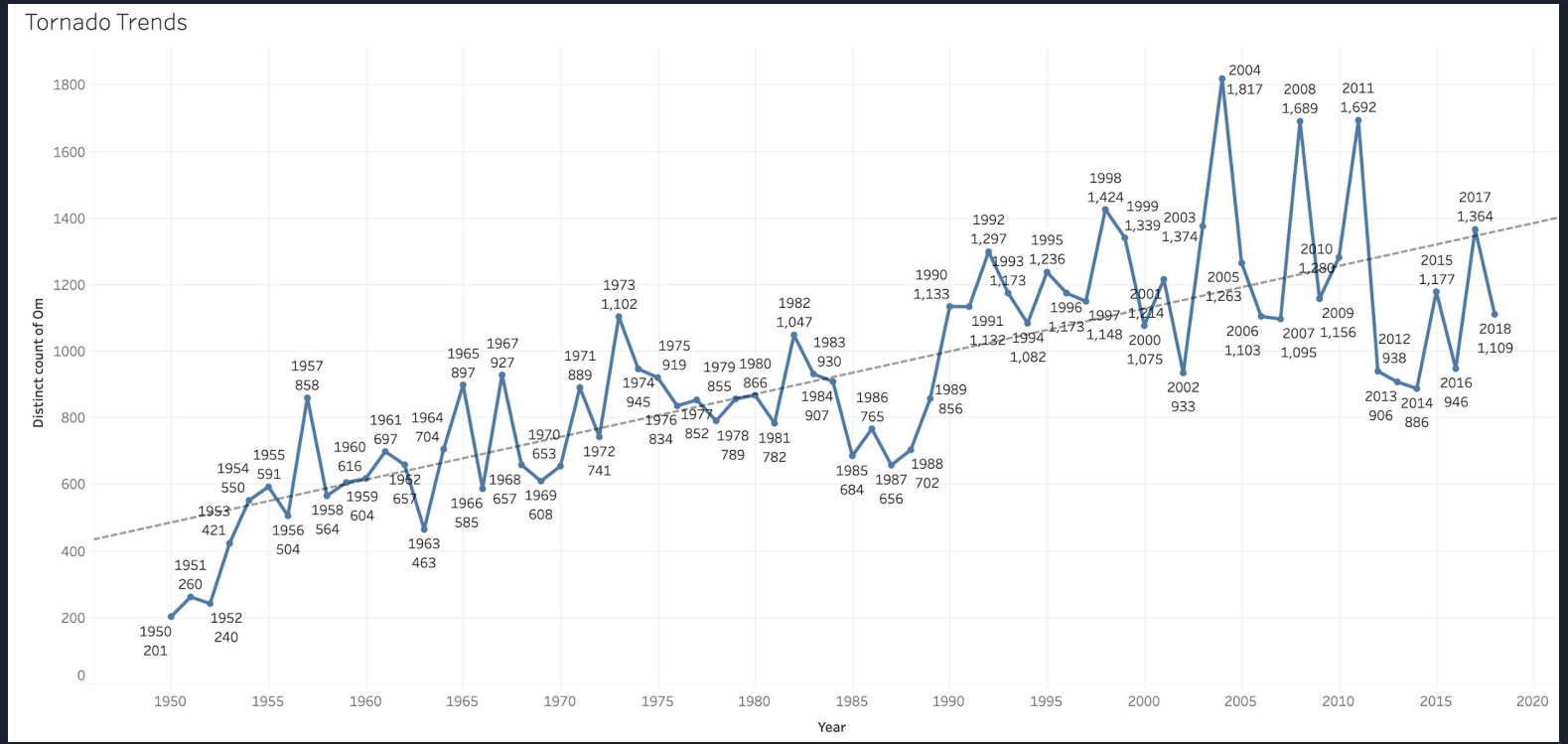

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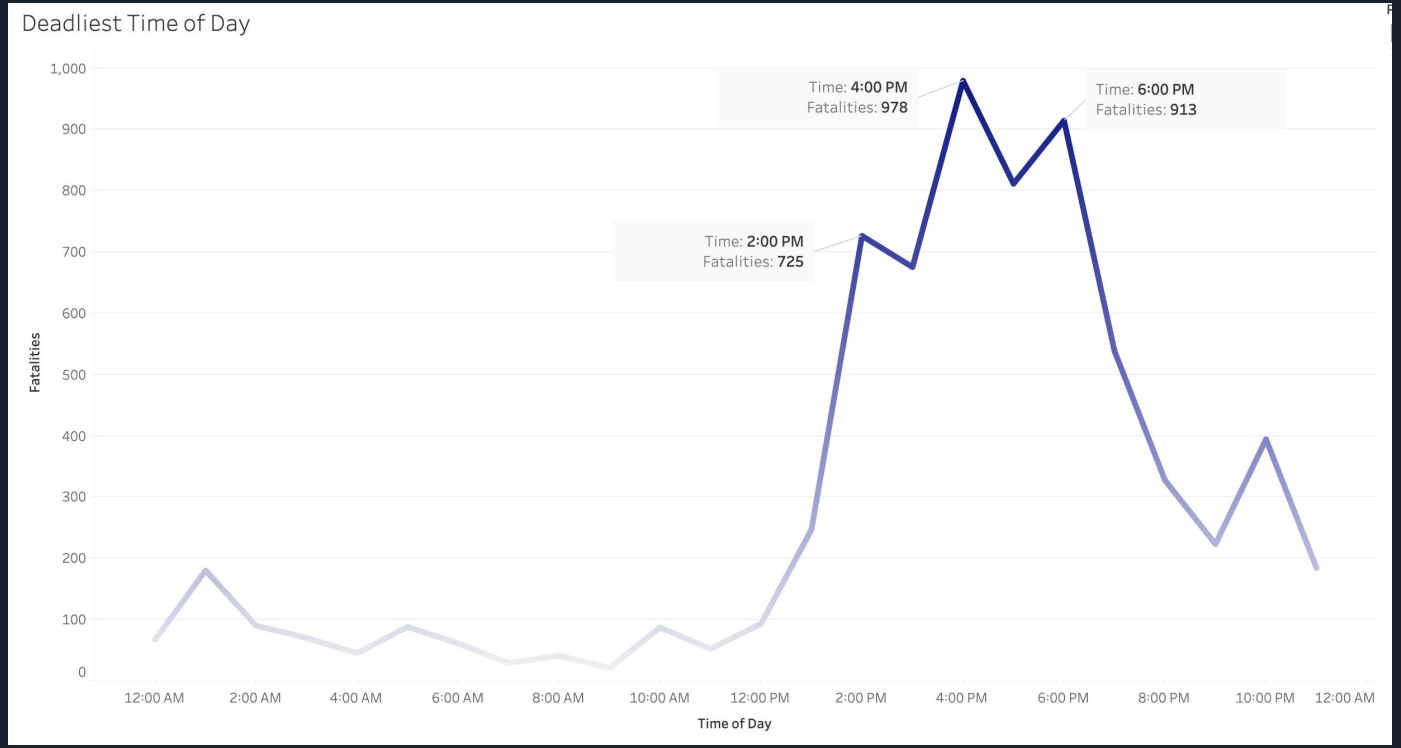

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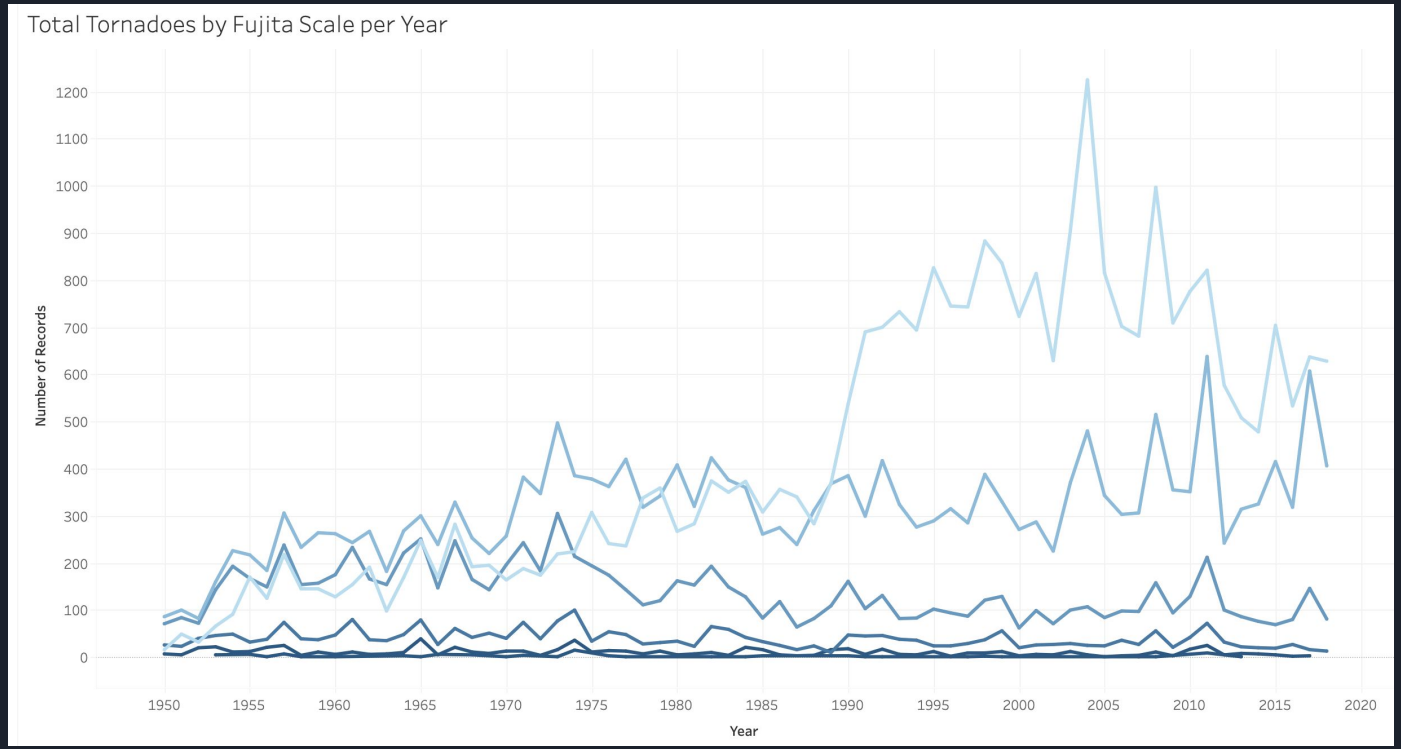

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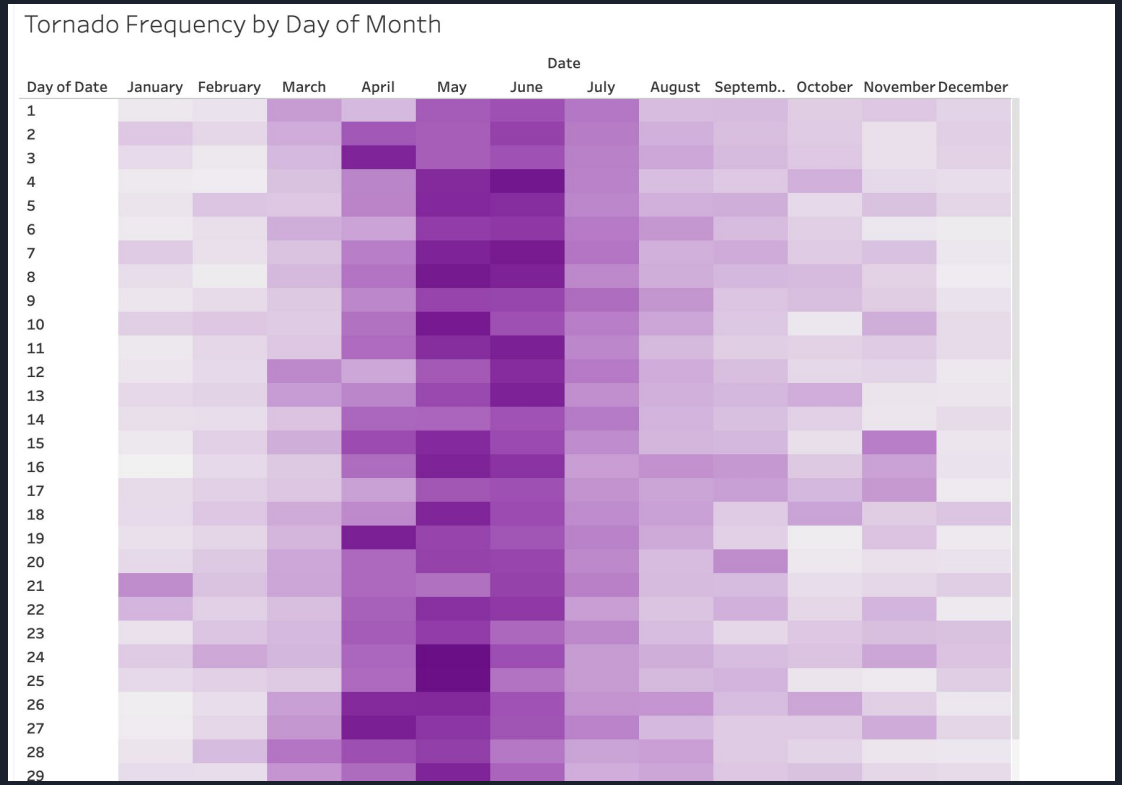


Machine Learning - Tornado Data Predictability

Historical Data

- Date Range: 1950-2018
- State
- Tornado Length/Width
- Magnitude (Fujita)
- Injuries
- Loss

Predictability Failures MSE Scores >.60 / R2 Scores<.20

- Injuries
  - Magnitude (Fujita)
  - Loss
  - Length/Width
- Death
  - Magnitude (Fujita)
  - Loss
  - Length/Width

Machine Learning - Deaths Predictability by Injuries

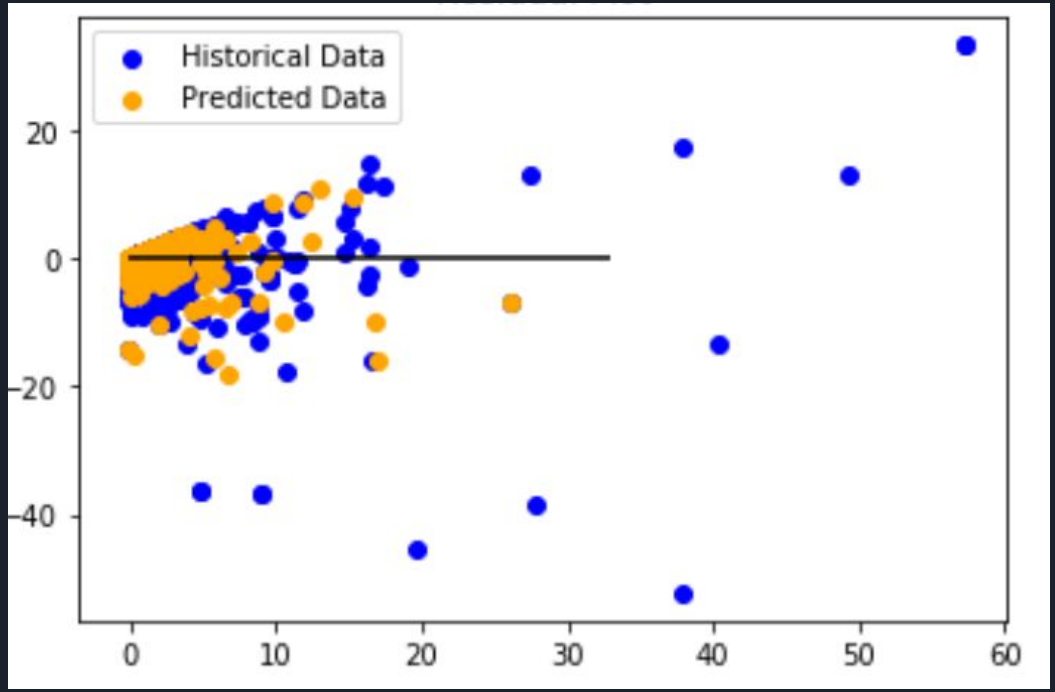
Total deaths between 1950 - 2018 was 6,918 (displayed). 62,896/64,511 records reported zero (0) fatalities

As indicated by the data graphed, there are 6 outliers that affected the outcome of the mean squared error (MSE) and R-Squared (R2) scores.

MSE score -< .23
R2 score -> .598

This is the best predictability score.

Machine Learning - Deaths Predictability by Injuries



Sources:

http://www.tornadohistoryproject.com/tornado/all/map

https://maps.google.com/

https://www.spc.noaa.gov/wcm/#data