

DATA VISUALIZATION & STATISTICS

# UNITED STATES YEARLY ACCIDENTS DASHBOARD

Presented by Amir Khoeilar

# INTRODUCTION

## Accidents Around US

- At least 115 million cars & trucks are on the streets every day.
- Traffic accidents:
  - Minor accidents
  - Fatal accidents
- Traffic accident causes:
  - Reckless driving
  - Distracted driving
  - Infrequent vehicle
  - Driving under influence





# INTRODUCTION

## NHTSA Stats & Reports

- National Highway Traffic Safety Administration (NHTSA)
- Lives lost on U.S roads in 2019 (36,096)
- Pedestrians Killed in traffic crashes (6,205)
- Distraction-Affected crash fatalities (3,142)



## Car Collision Kills Actor James Dean

PASO ROBLES, Calif. (UP).— James Dean, 24-year-old film star, was killed early Friday night in a head-on collision of his German sports car some 30 miles east of

Turnipseed received minor injuries.

A hospital doctor said Dean died instantly and put the time of death at about 5:40 p.m. He said the actor's body was "terribly battered", by the impact and that he suffered a broken neck, numerous broken bones, and cuts and bruises.

The collision threw Dean's sports car 150 feet down the highway, the CHP said.

Sanford Roth, a Warner Brothers still photographer, said he was following Dean's car a few miles behind. He said neither he nor his passenger, Bill Hickman, of Metro-

## BANKER KILLED IN ROAD ACCIDENT



Rider's car (pictured above) shows catastrophic damage following the crash.

A banker (42) was killed in London yesterday evening following a collision with a lorry in the early hours.

hospital to receive emergency care. "Mr Rider died, almost instantly, at the scene of the crash," he reported.

Police would like to encourage any eye witnesses of the incident, which took place between 1-2am on 2<sup>nd</sup> September 2019, to come forward. They, also, would like to emphasise the importance of ensuring that seatbelts are worn at all times by any passenger in a moving vehicle.

Mr Crawley (a colleague of Ian Rider) has said that Ian, "was a quiet, private man who liked travelling". He added that Ian was very dedicated to his job and would be greatly missed. Royal & General send their condolences to Ian's family during this time.

Mr Rider was never married. He leaves behind a nephew (14).



STORIES THAT MATTER

CRASH KILLS FATHER AND INJURES CHILDREN CARMEL VALLEY

ASE TO 40 CITY OF SAN DIEGO RESCINDS FURLOUGH OF 800 WORKERS WIT ALERT 11:32

# INTRODUCTION



## QUESTION

HOW MANY TRAFFIC ACCIDENTS ARE HAPPENING YEARLY  
IN UNITED STATES?  
WHAT ARE THE MAIN ATTRIBUTES & CAUSES OF  
ACCIDENTS?



## SOLUTION

AN END-TO-END PIPELINE FOR A DASHBOARD THAT  
PROVIDES YEARLY STATISTICS & VISUALIZATION OF  
TRAFFIC ACCIDENTS RECORDS AROUND UNITES STATES.





## **IMPACT & SUCCESS**

- A HELPFUL TOOL TO CONSIDER FOR NHTSA & THE TRANSPORTATION DEPARTMENTS OF STATES
- REDUCE THE ACCIDENT RATES OF CITIES & STATES BY LOCAL AUTHORITIES
- EDUCATIONAL TOOL & AWARENESS FOR THE GENERAL PUBLIC



# DATA & TOOLS

## Source & Libraries

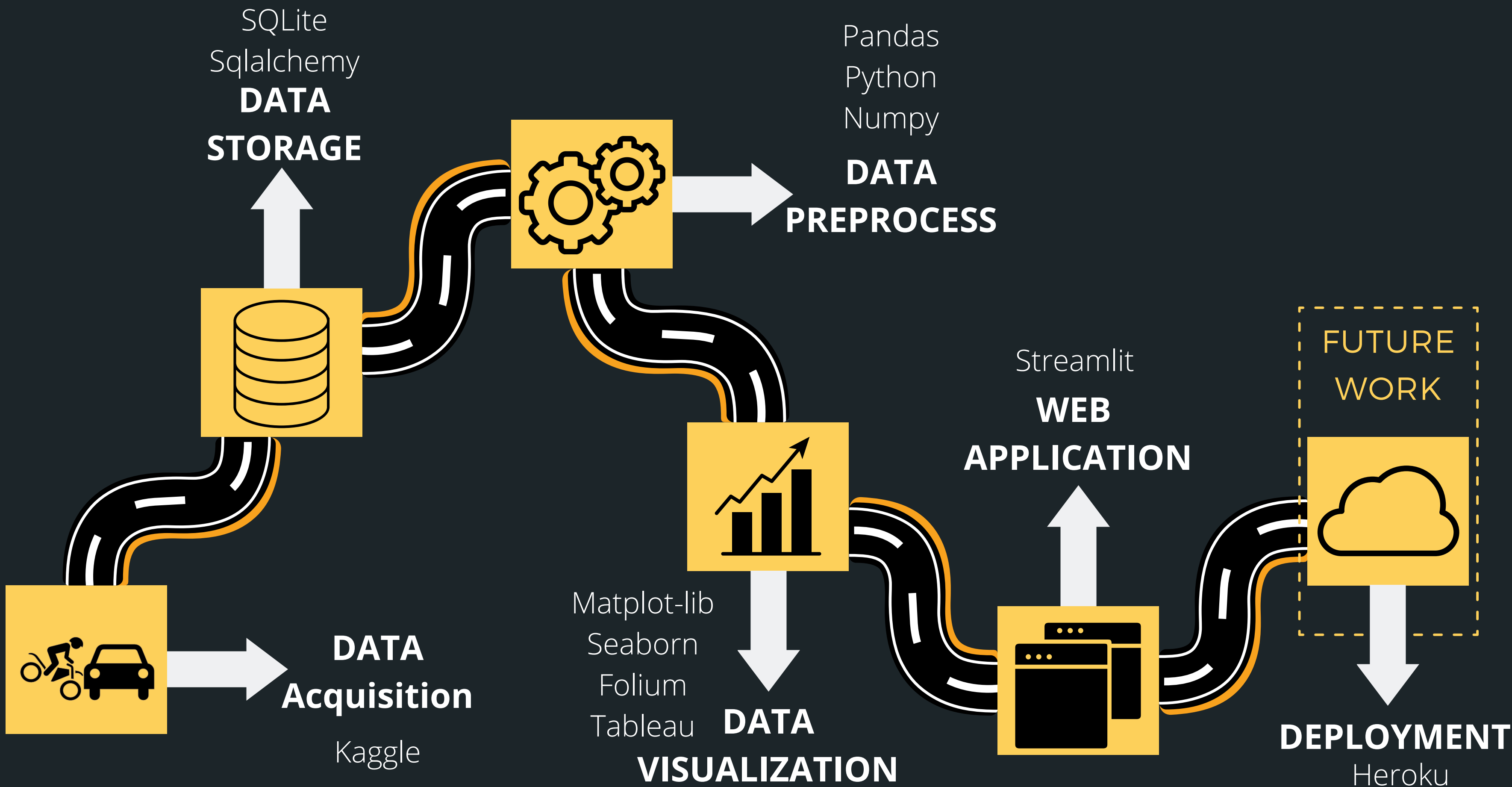
- **DATA**

- USA ACCIDENTS 2019 & 2020  
from Kaggle ( 1mil accidents )

- **Tools**

- Sqlite, Sqlalchemy
- Pandas, Numpy,
- Matplot-lib, Seaborn, Tableau, Folium
- Streamlit





# THE PIPELINE



# RESULTS

## USA Accidents Dashboard

### UNITED STATES YEARLY ACCIDENTS CHARTS & VISUALIZATIONS

The dataset used here for exploratory data analysis is "USA Accidents" - A Countrywide Traffic Accident Dataset (2019 & 2020) from [www.kaggle.com](https://www.kaggle.com). Each dataset is explored separately for better understanding of the accidents.

US-Accidents can be used for numerous applications such as real-time car accident prediction, studying car accidents hotspot locations, casualty analysis and extracting cause and effect rules to predict car accidents, and studying the impact of precipitation or other environmental stimuli on accident occurrence.

Select Dataset:

USA Accidents Data 2019

#### Total Accidents:

Total accidents recorded all around USA in year 2019: **261772**

#### Graphs & Visualizations

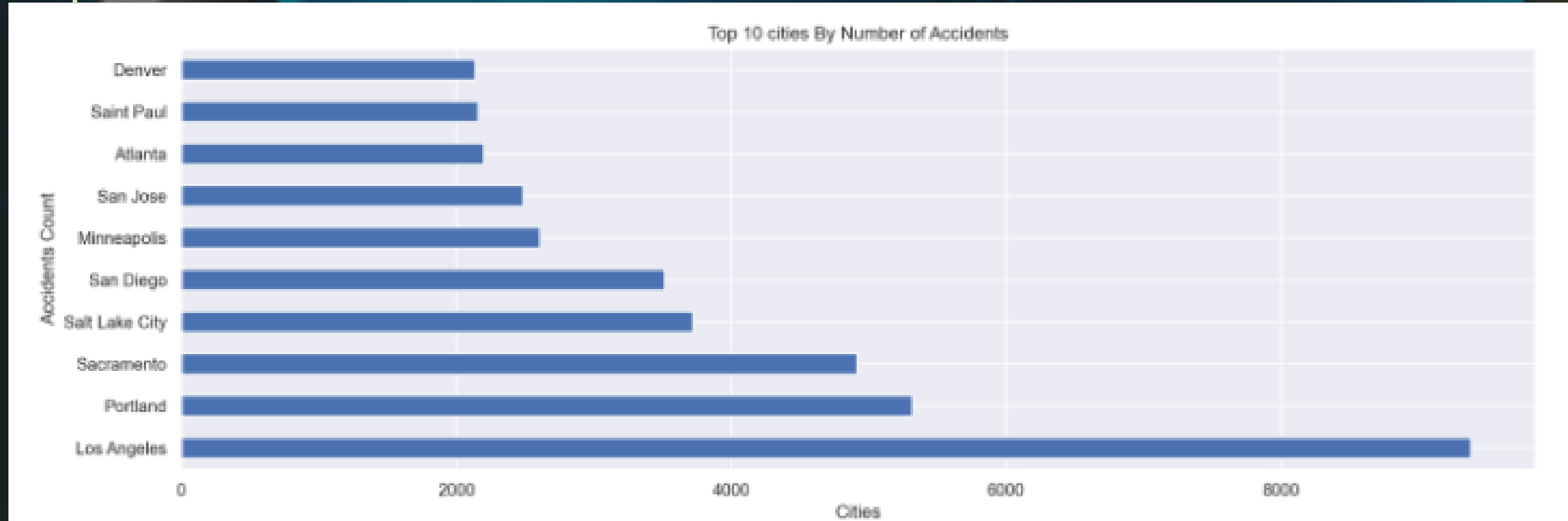
Top 10 cities with highest number of accidents:

☒ Show Graph



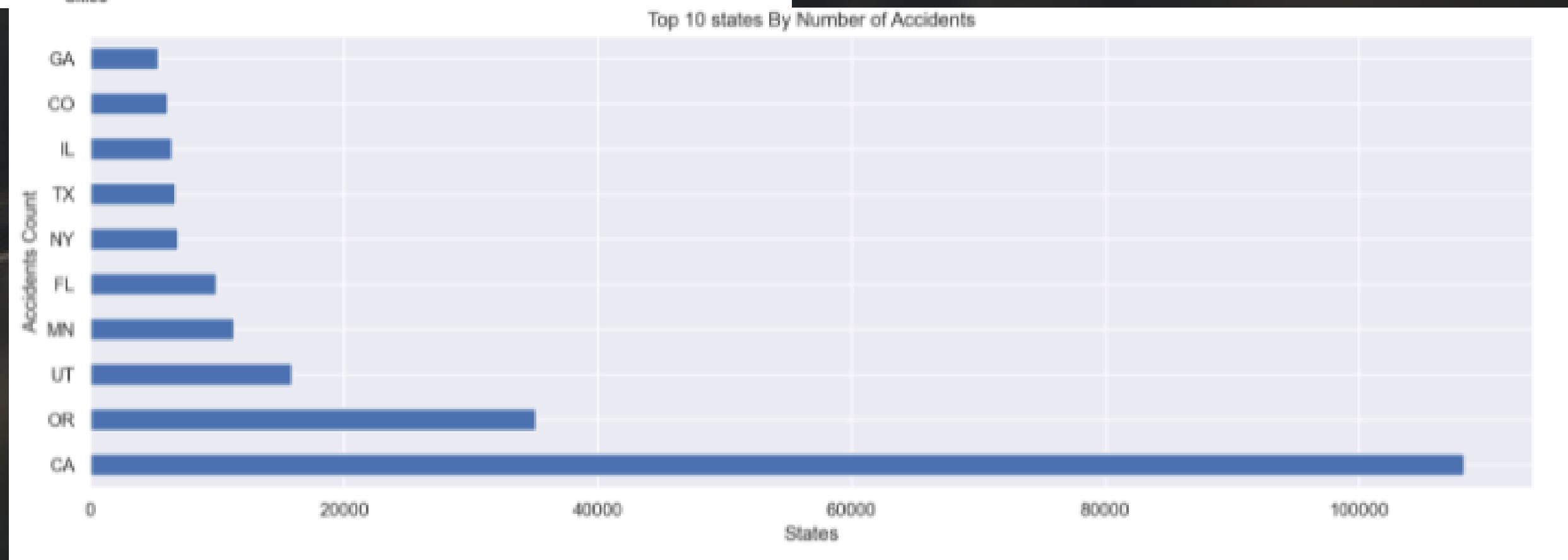
# RESULTS

## Top 10 Cities & States



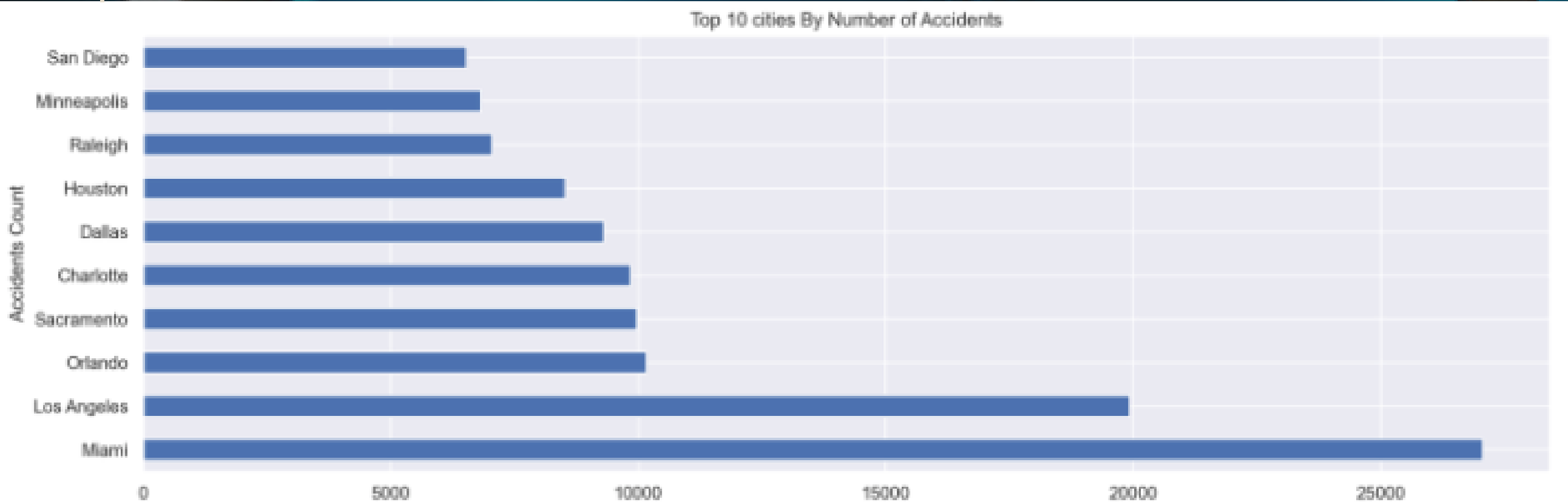
**Total Accidents  
Recorded**  
**261772**

**2019**



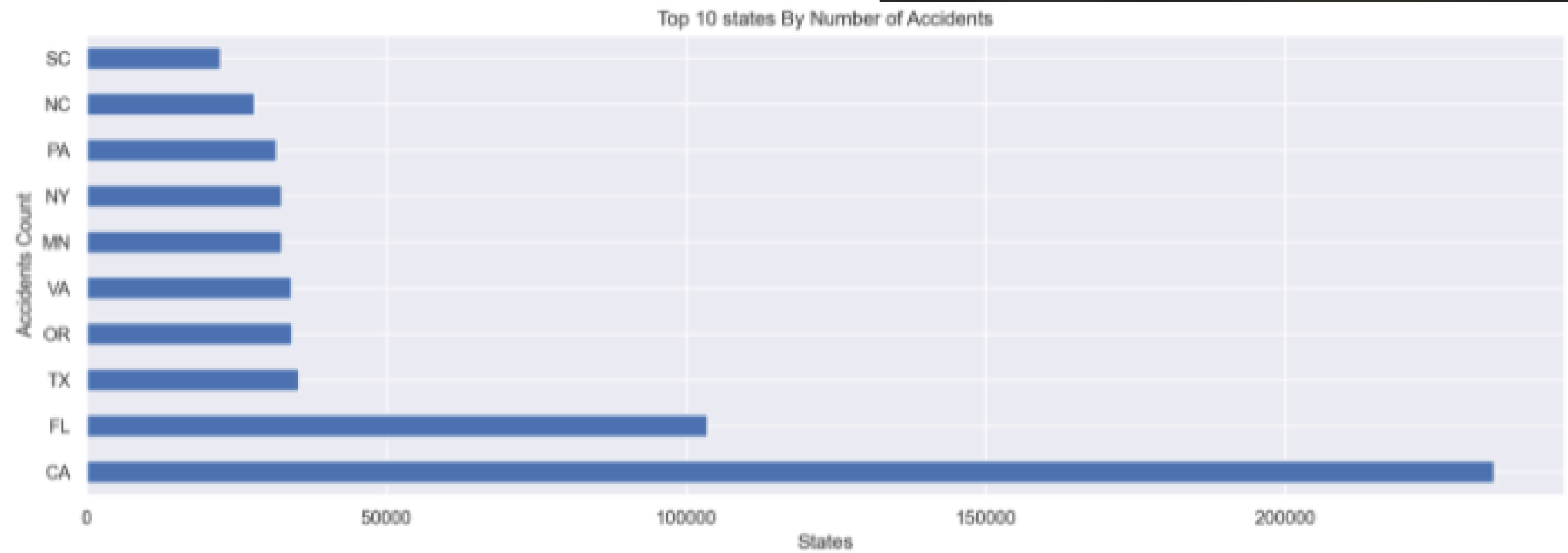
# RESULTS

## Top 10 Cities & States



**Total Accidents  
Recorded**  
**787932**

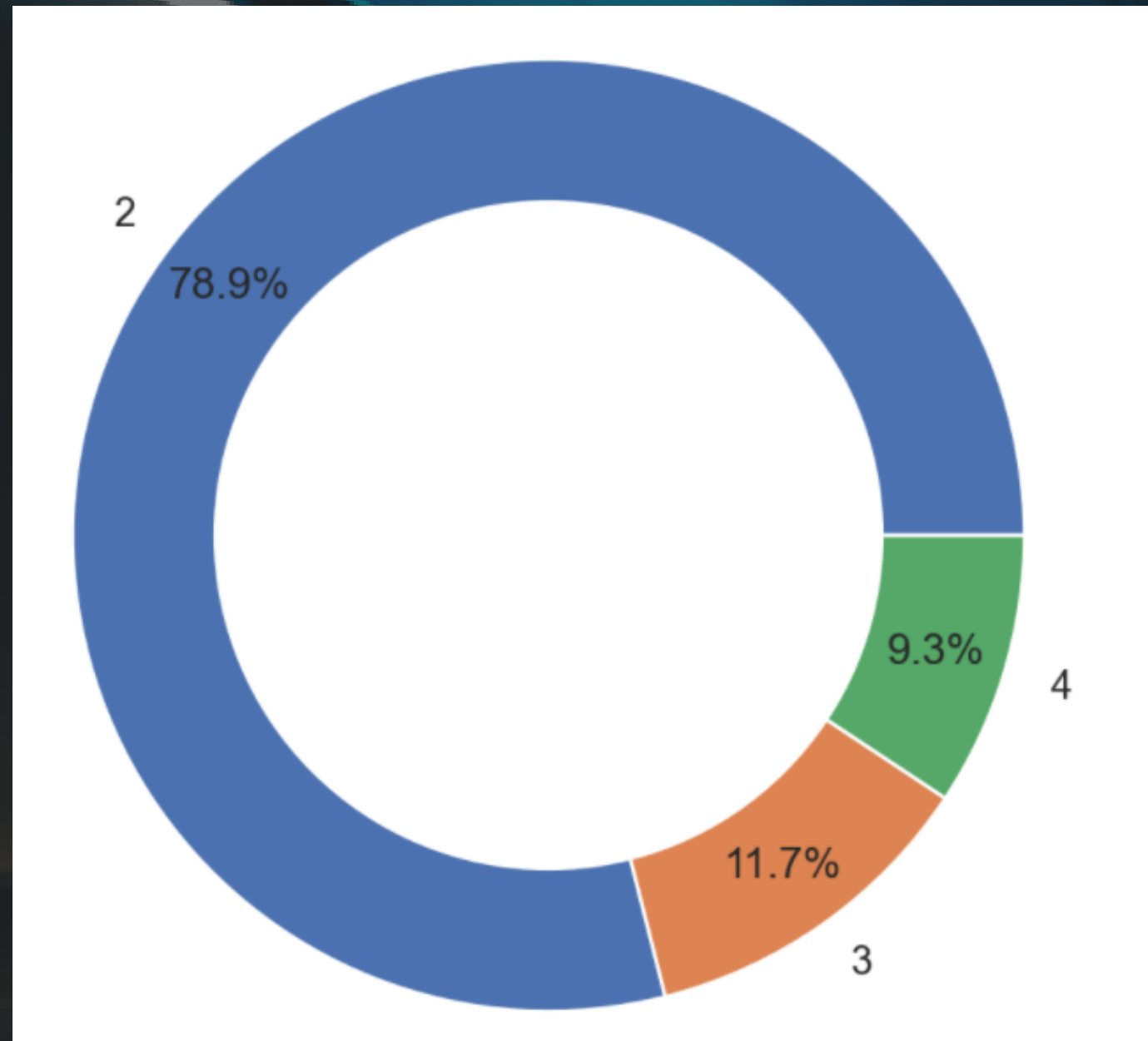
**2020**



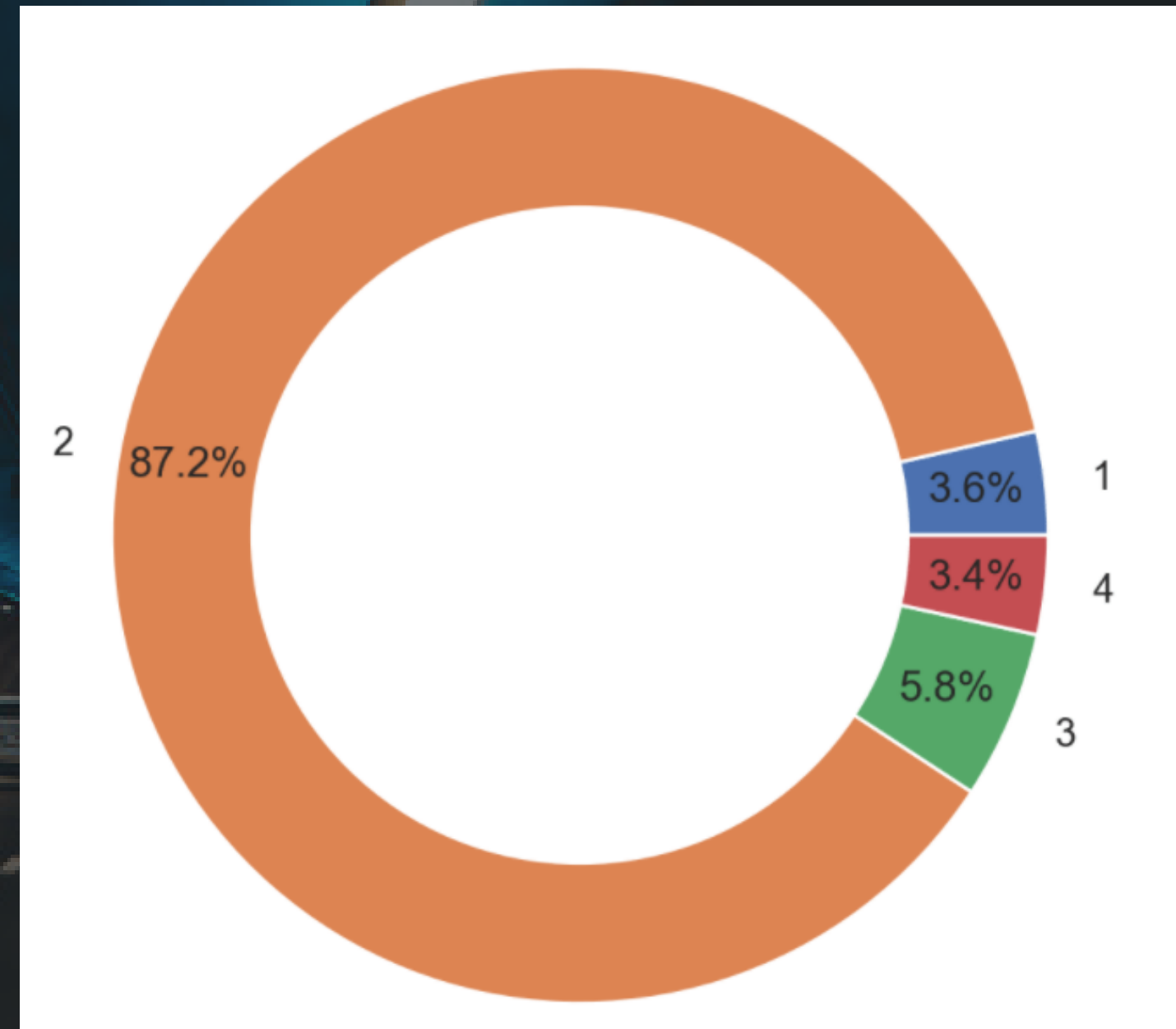


# RESULTS

USA Accidents Severity Class



2019

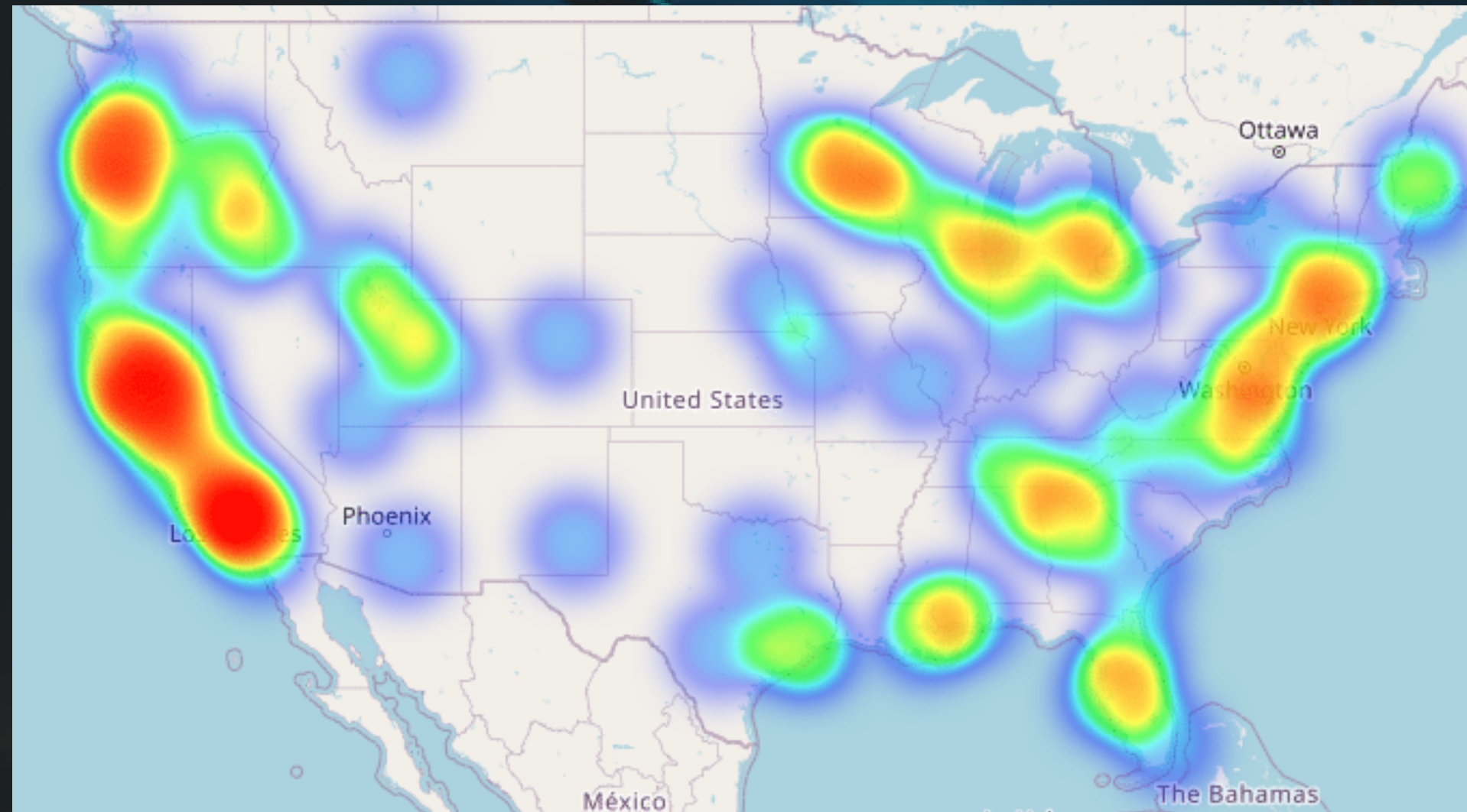


2020

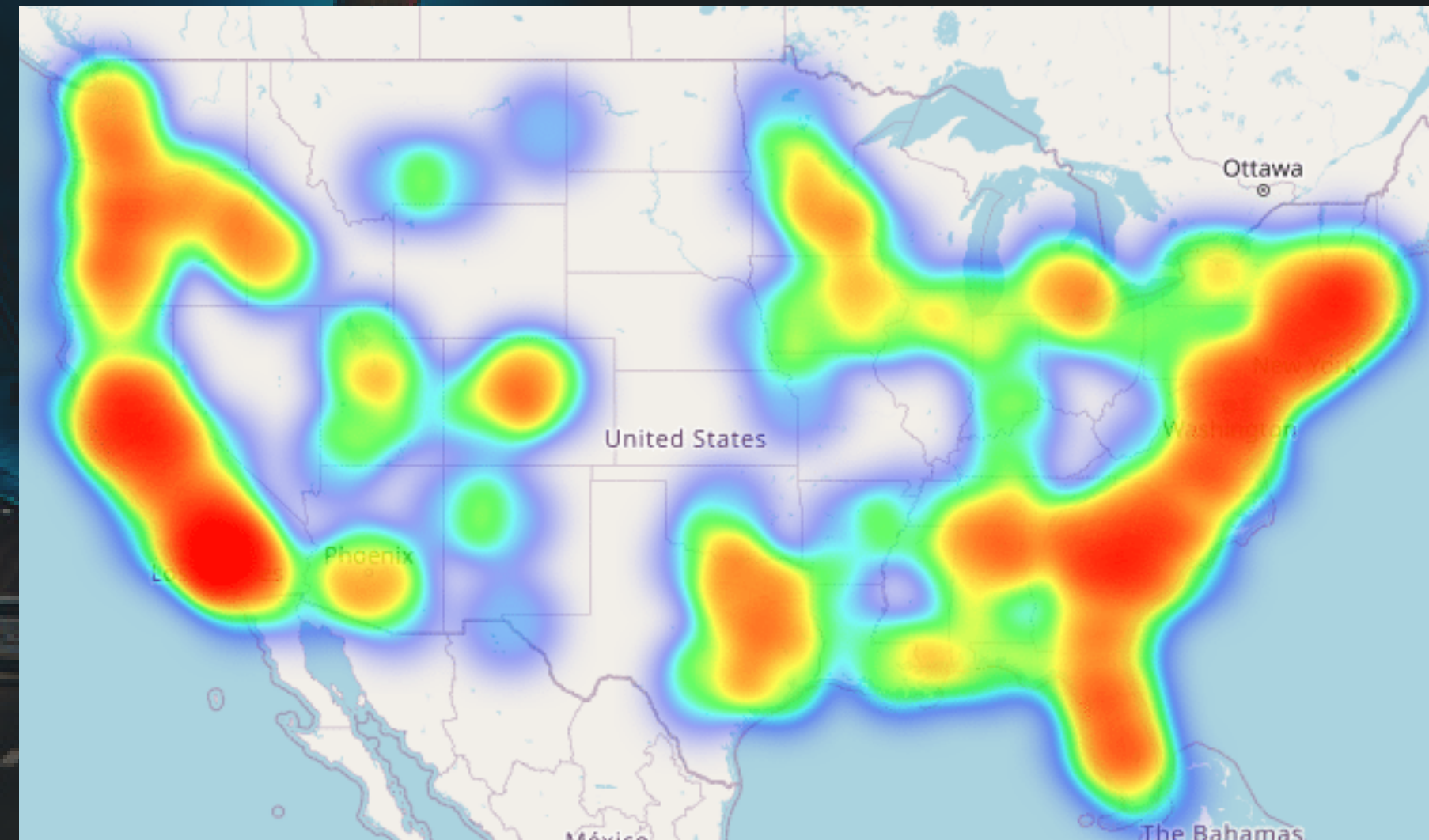


# RESULTS

## USA Accidents Heatmap



2019



2020





# CONCLUSION

## Insights

- Yearly updated data will provide us extensive knowledge about accidents around the United States
- The dashboard could be used for education & strategic planning by authorities
- There was an increase in accidents from 2019 to 2020 (although pandemic).
- Accidents severity is mostly in class 2 - Minor injuries/1 travel lane blocked
- Much increase of accidents in south-east states than any other parts of the country



# FUTURE WORK

---





- Gather additional data yearly to make the dashboard more reliable.
- Perform an accident severity multiclass classification model.
- Perform NLP of accidents descriptions columns to better analyze the causes of accidents.












# APPENDIX

## LEVEL (SEVERITY) OF TRAFFIC INCIDENTS

LEVEL	CRITERIA	EXAMPLES	AGENCY RESPONSIBLE FOR ESTABLISHING UNIFIED COMMAND
Level I	No injuries, No travel lanes blocked	Disabled vehicle on shoulder, Minor Traffic Incident	Law Enforcement 
Level II	Minor injuries and/or 1 travel lane blocked	Stalled vehicle in a travel lane, Rear-end collision with minor injuries	Law Enforcement 
Level III	Serious injuries or 2 or more travel lanes blocked	Multi-vehicle crash, overturned tractor-trailer (No HAZMAT involved)	Fire & Rescue 
Level IV	Multiple agencies needed, HAZMAT spill, threat to life and property extends beyond the confines of the traffic incident scene, or <b>ALL LANES BLOCKED</b>	Overturned fuel/HAZMAT truck, fallen power lines, or sign structure, pavement failures in the roadway, multiple vehicle crash, life threatening injuries or possible fatality.	Fire & Rescue 

## TRAFFIC INCIDENT RESPONSE MATRIX

LEVEL	LAW ENFORCEMENT 	FIRE & RESCUE 	EMS 	EPD/HAZMAT 	TOWING & RECOVERY 	H.E.R.O. UNIT 	DOT 
Level I	<ul style="list-style-type: none"> <li>Notify dispatch</li> <li>Identify nearest shoulder or safe area for relocating vehicle(s)</li> <li>Relocate vehicle(s) to the shoulder or safe area, to await recovery</li> </ul>	No Responsibility	No Responsibility	No Responsibility	<ul style="list-style-type: none"> <li>When directed, respond &amp; remove vehicle(s) from the roadway shoulder, as quickly &amp; safely as possible</li> </ul>	<ul style="list-style-type: none"> <li>Notify TMC</li> <li>Relocate vehicle(s) to shoulder/safe area, to await recovery</li> </ul>	<ul style="list-style-type: none"> <li>Notify TMC</li> <li>Assist relocating vehicle(s)</li> </ul>
Level II	<ul style="list-style-type: none"> <li>Notify dispatch</li> <li>Establish ICP</li> <li>Assist the injured</li> <li>Control crowds &amp; traffic</li> <li>Conduct investigation</li> </ul>	<ul style="list-style-type: none"> <li>May be dispatched to care for injured</li> </ul>	<ul style="list-style-type: none"> <li>Provide medical care to the injured</li> </ul>	No Responsibility	<ul style="list-style-type: none"> <li>When directed, remove vehicle(s) from roadway</li> <li>Remove crash debris from roadway</li> </ul>	<ul style="list-style-type: none"> <li>Notify TMC</li> <li>Assist the injured</li> <li>Establish Traffic Controls</li> <li>Assist in relocating vehicle(s) from roadway</li> </ul>	<ul style="list-style-type: none"> <li>Assist in removal of vehicles</li> <li>Assist with clean-up</li> <li>Check for State property damage</li> </ul>
Level III	<ul style="list-style-type: none"> <li>Secure traffic incident scene</li> <li>Assist the injured until Fire and EMS arrives</li> <li>Assist with Traffic Control</li> <li>Conduct investigation</li> </ul>	<ul style="list-style-type: none"> <li>Secure scene</li> <li>Protect life and property</li> <li>Establish ICP</li> </ul>	<ul style="list-style-type: none"> <li>Provide medical care to the injured</li> </ul>	<ul style="list-style-type: none"> <li>Secure area</li> <li>Clean-up of debris</li> </ul>	<ul style="list-style-type: none"> <li>When directed, remove vehicles from roadway, after injured are treated</li> <li>Remove crash debris from roadway</li> </ul>	<ul style="list-style-type: none"> <li>Notify TMC</li> <li>Assist the injured</li> <li>Establish &amp; maintain traffic controls</li> <li>Assist with the removal of vehicle(s) from the roadway</li> </ul>	<ul style="list-style-type: none"> <li>Establish Detours as needed</li> <li>Check for State property damage</li> <li>Provide support equipment &amp; materials</li> </ul>
Level IV	<ul style="list-style-type: none"> <li>Secure traffic incident scene</li> <li>Assist the injured until Fire and EMS arrives</li> <li>Assist with traffic control</li> </ul>	<ul style="list-style-type: none"> <li>Secure scene</li> <li>Protect life and property</li> <li>Establish ICP</li> <li>Request clean-up and/or containment of hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>Provide medical care to the injured</li> </ul>	<ul style="list-style-type: none"> <li>Secure area</li> <li>Clean-up of hazardous materials and debris</li> </ul>	<ul style="list-style-type: none"> <li>When directed, by the Investigating Officer, remove vehicles from roadway, after injuries and/or HAZMAT dangers have been addressed</li> <li>Remove crash debris from roadway</li> </ul>	<ul style="list-style-type: none"> <li>Notify TMC</li> <li>Assist with the injured</li> <li>Establish traffic controls</li> <li>Assist with the removal of vehicle(s) from the roadway</li> </ul>	<ul style="list-style-type: none"> <li>Establish detours as needed</li> <li>Assist with clean-up</li> <li>Check for State property damage</li> <li>Provide support equipment &amp; materials</li> </ul>

**NOTE:** Shaded areas  denote Key Agencies for each Level of Traffic Incident, during initial response.

**REMEMBER:** "The responding agency arriving first at the traffic incident scene, by default, is the traffic incident manager, at least until the nature of the incident changes and/or additional response agencies arrive on the scene and assume command."

