

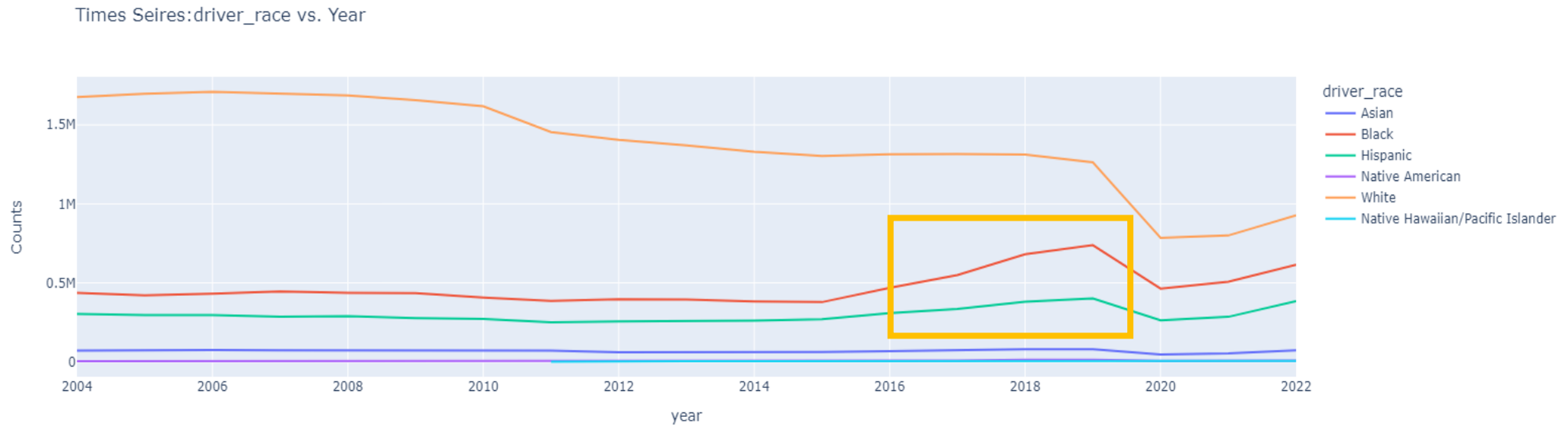
Exploring Driver Race and Policing Data Through Visualizations

By Yuting Weng



Part I: Observing Patterns and Trends with *Plotly* Interactive Graphs

Starting from **2015**, there appears to be a noticeable increase in the number of stops for **black individuals**, relative to other races.



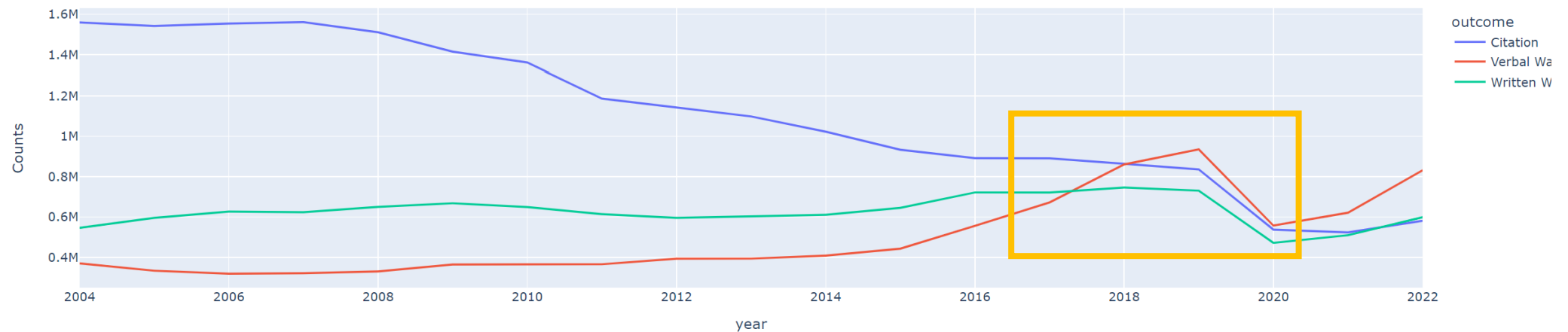
In 2018, the number of **Verbal Warnings** surpassed all other two outcomes.

1. Time Series Plots for Key Variables in Stops Dataframe on Year Basis

Select Variable:

Outcome

Times Seires:outcome vs. Year



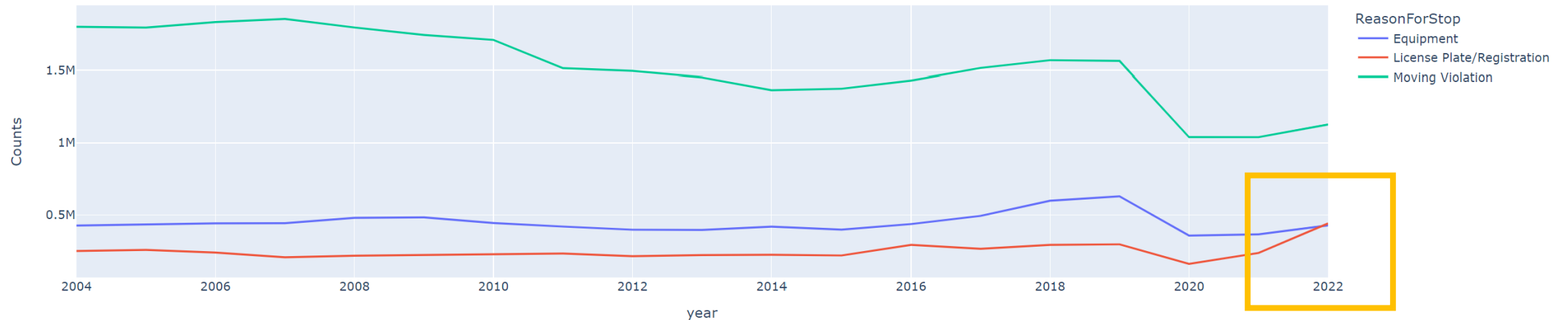
There has been an increase in **License Plate/Registration** starting from 2020. By 2022, the number of issued license plates and registrations surpassed the number of Equipment

1. Time Series Plots for Key Variables in Stops Dataframe on Year Basis

Select Variable:

Reason for Stop

Times Seires:ReasonForStop vs. Year



From 2004 to 2023, **Citations** constitute the largest proportion of stop outcomes for **all races**.

It is worth noticing that, only for **black** individuals, **Verbal Warnings** represent the second-largest proportion of stop outcomes.

3. Pie Charts: Proportions of Police Related Variables by Driver Race

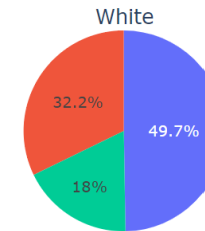
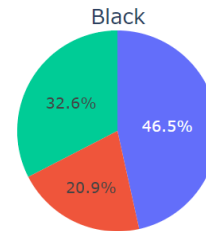
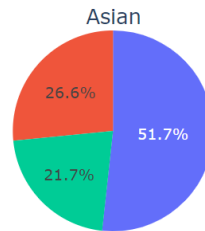
Select Year Range:



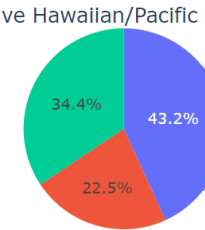
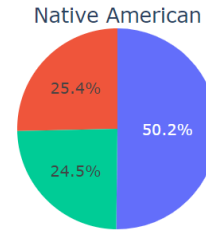
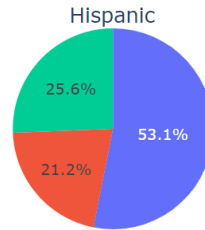
Select Police Variable:

Outcome

outcome Proportions by Driver Race (%) from 2004 to 2023



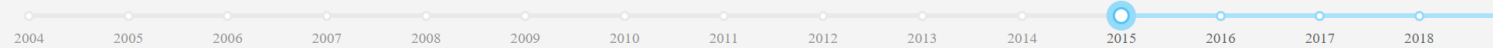
■ Citation
■ Written Warning
■ Verbal Warning



Starting from 2015,
the proportion of
Verbal Warnings
has become the
largest among stop
outcomes for **black**
individuals.

3. Pie Charts: Proportions of Police Related Variables by Driver Race

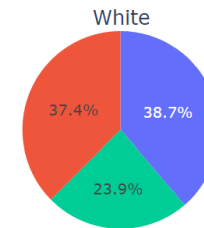
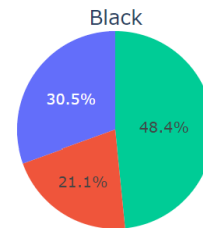
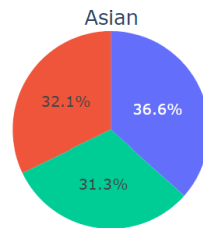
Select Year Range:



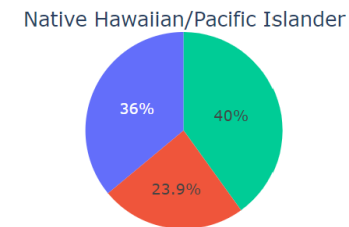
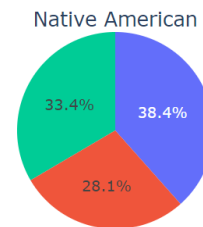
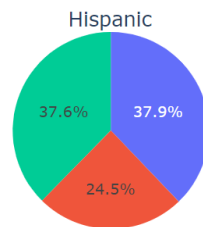
Select Police Variable:

Outcome

outcome Proportions by Driver Race (%) from 2015 to 2023



■ Citation
■ Written Warning
■ Verbal Warning



From 2004 to 2023,
Moving Violation
constitute the
largest proportion
of stop reasons for
all races.

3. Pie Charts: Proportions of Police Related Variables by Driver Race

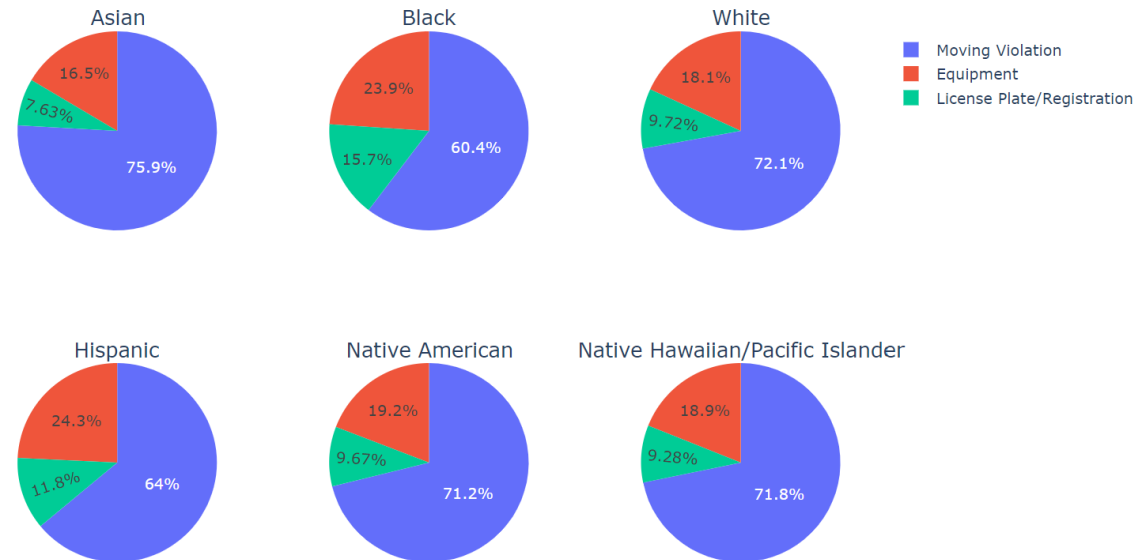
Select Year Range:



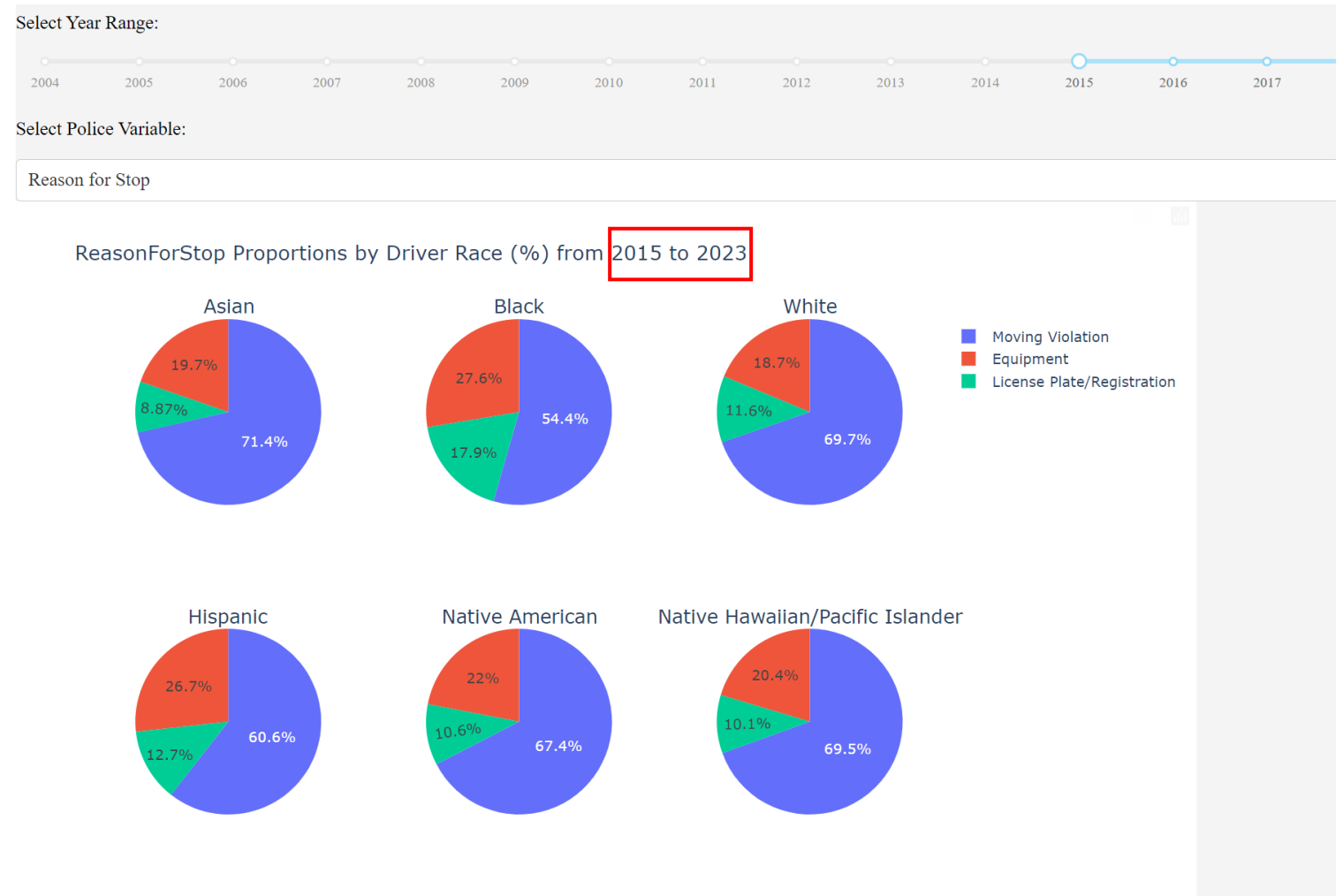
Select Police Variable:

Reason for Stop

ReasonForStop Proportions by Driver Race (%) from 2004 to 2023



The proportion of **Moving Violations** has decreased over the years.

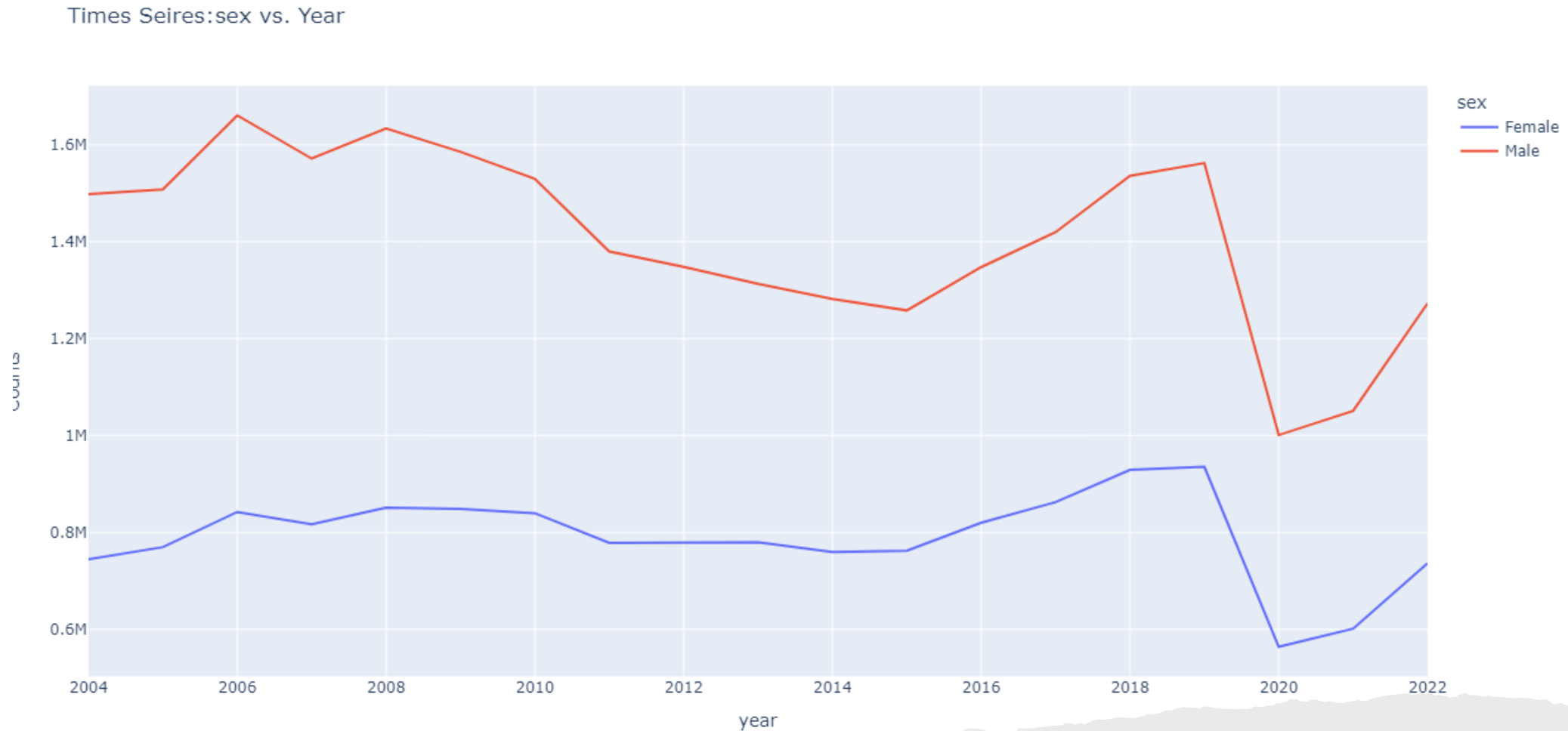


Part II: Playing with Different Kinds of Visualizations

Including Time-Series Plot, Histogram, Pie Chart, Side-by-Side Bar Plot, Sunburst Chart, Parallel Categories Diagram

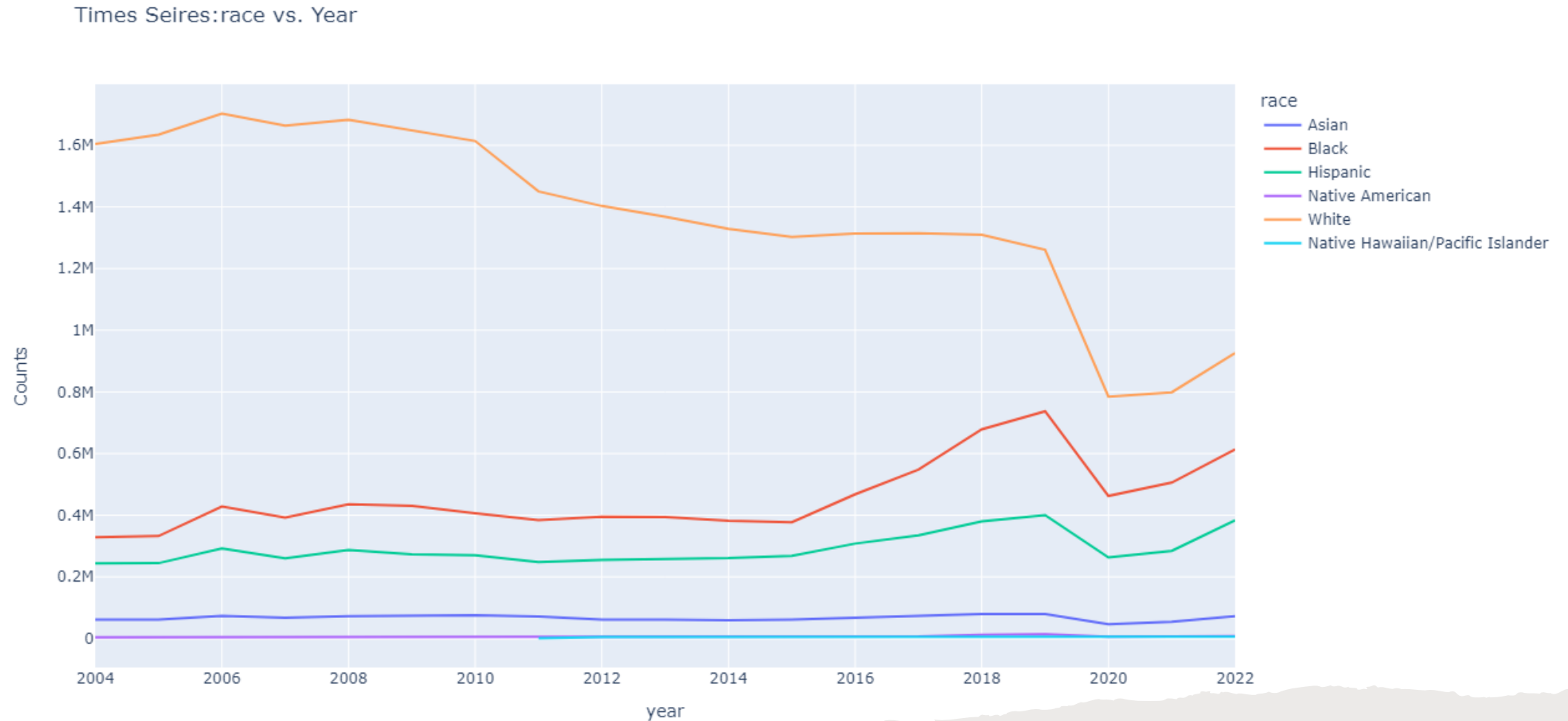
1. Time-Series Plot on Year Basis

a. **Sex** and Year



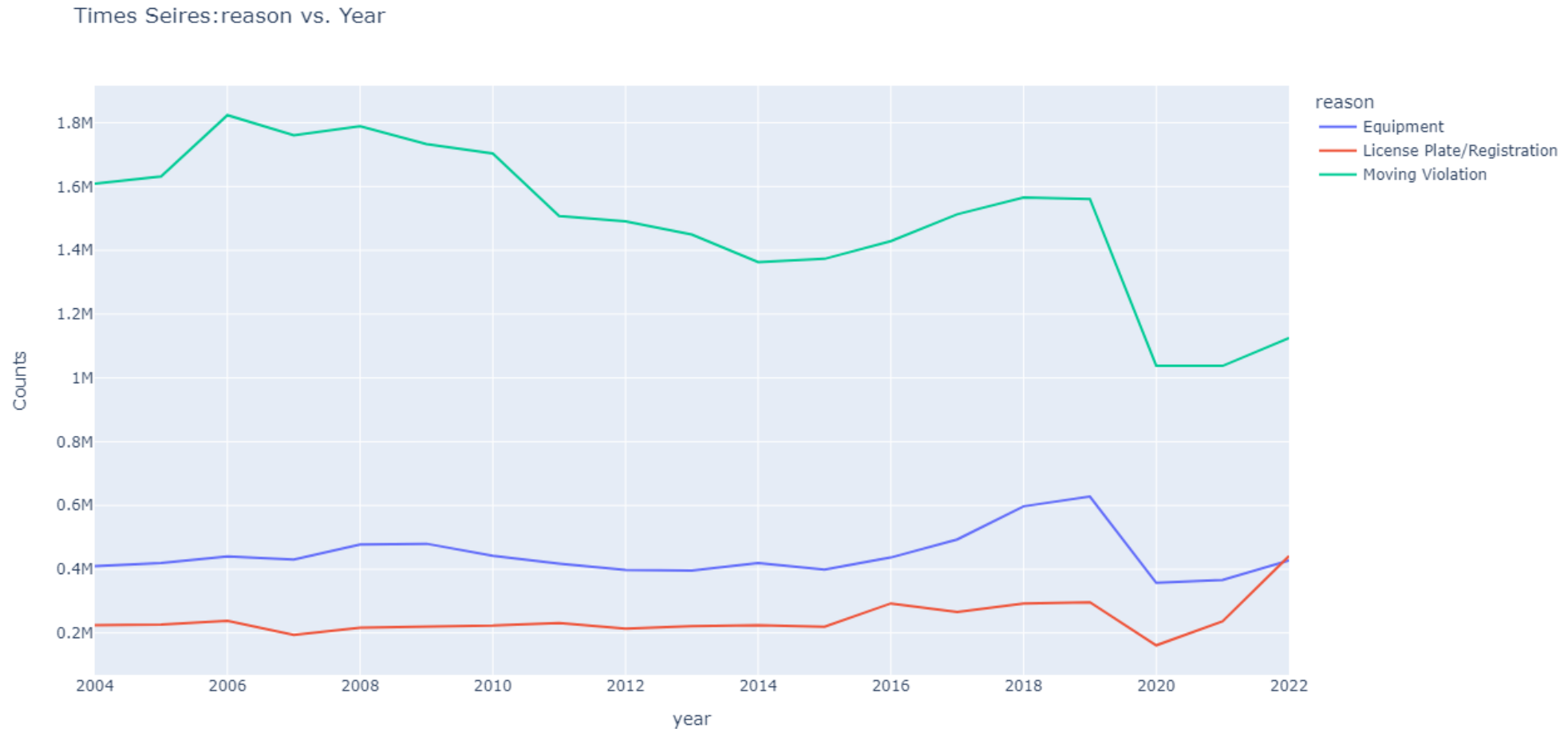
1. Time-Series Plot on Year Basis

b. **Race** and Year



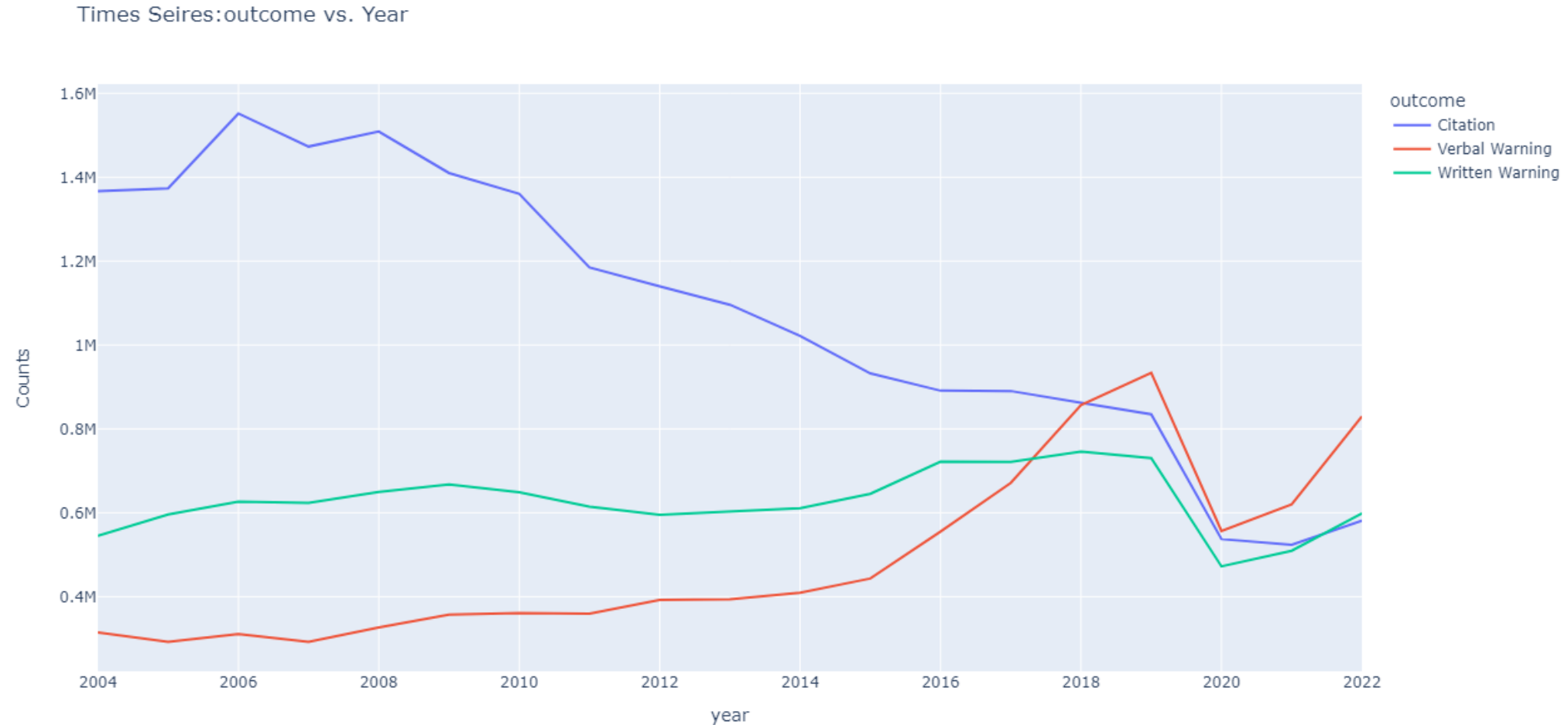
1. Time-Series Plot on Year Basis

c. Reason for Stop and Year



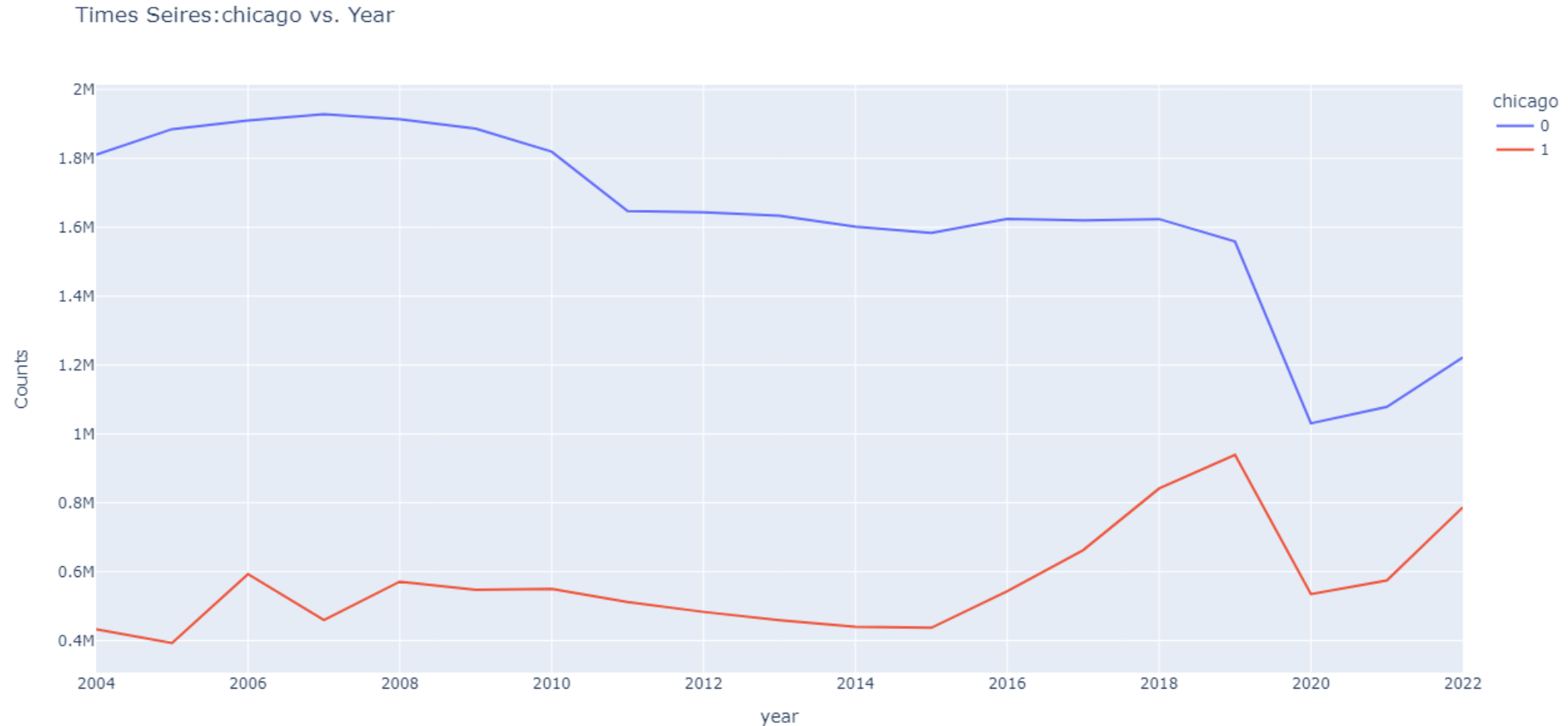
1. Time-Series Plot on Year Basis

d. Outcome of Stop and Year



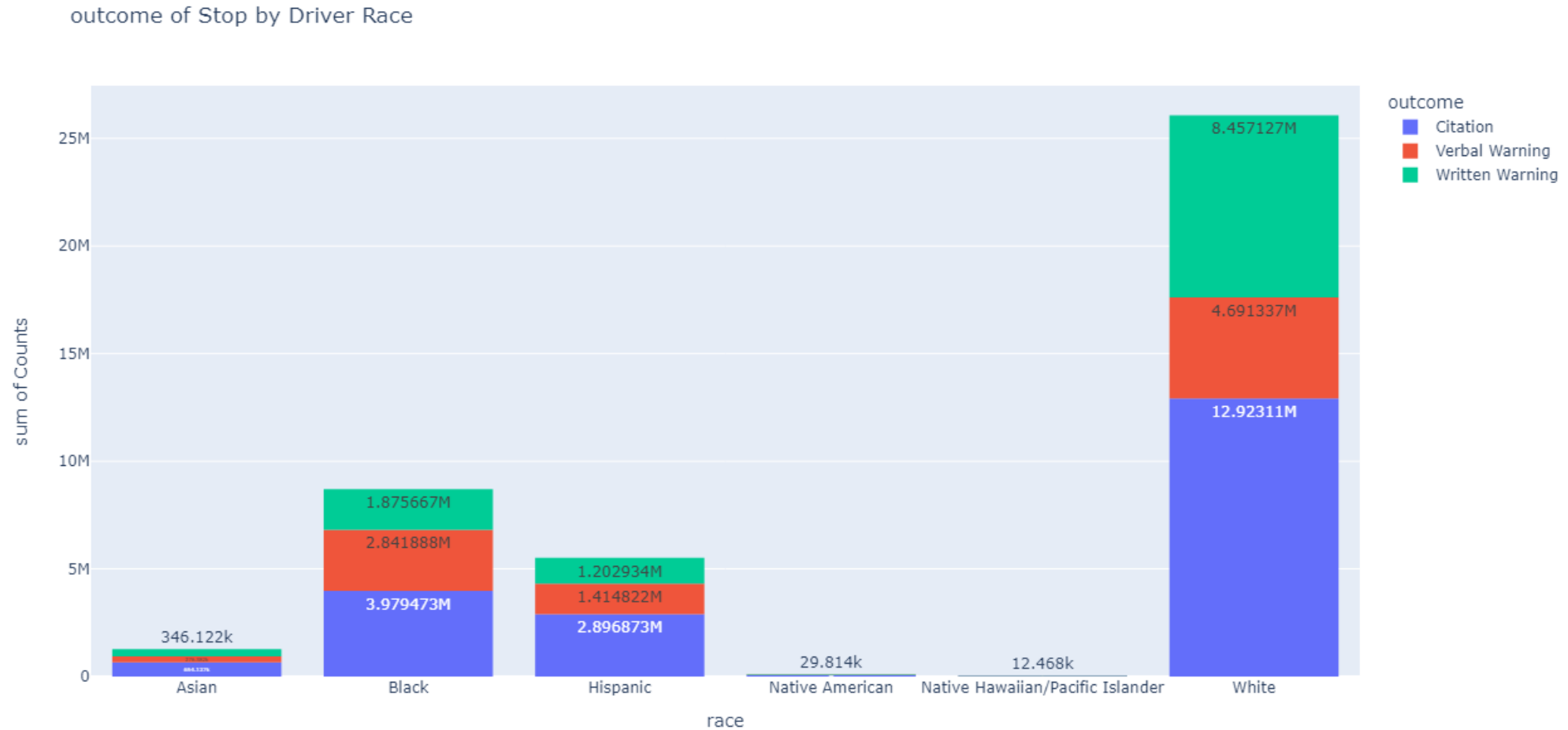
1. Time-Series Plot on Year Basis

e. **Chicago or Other Area in IL** and Year:



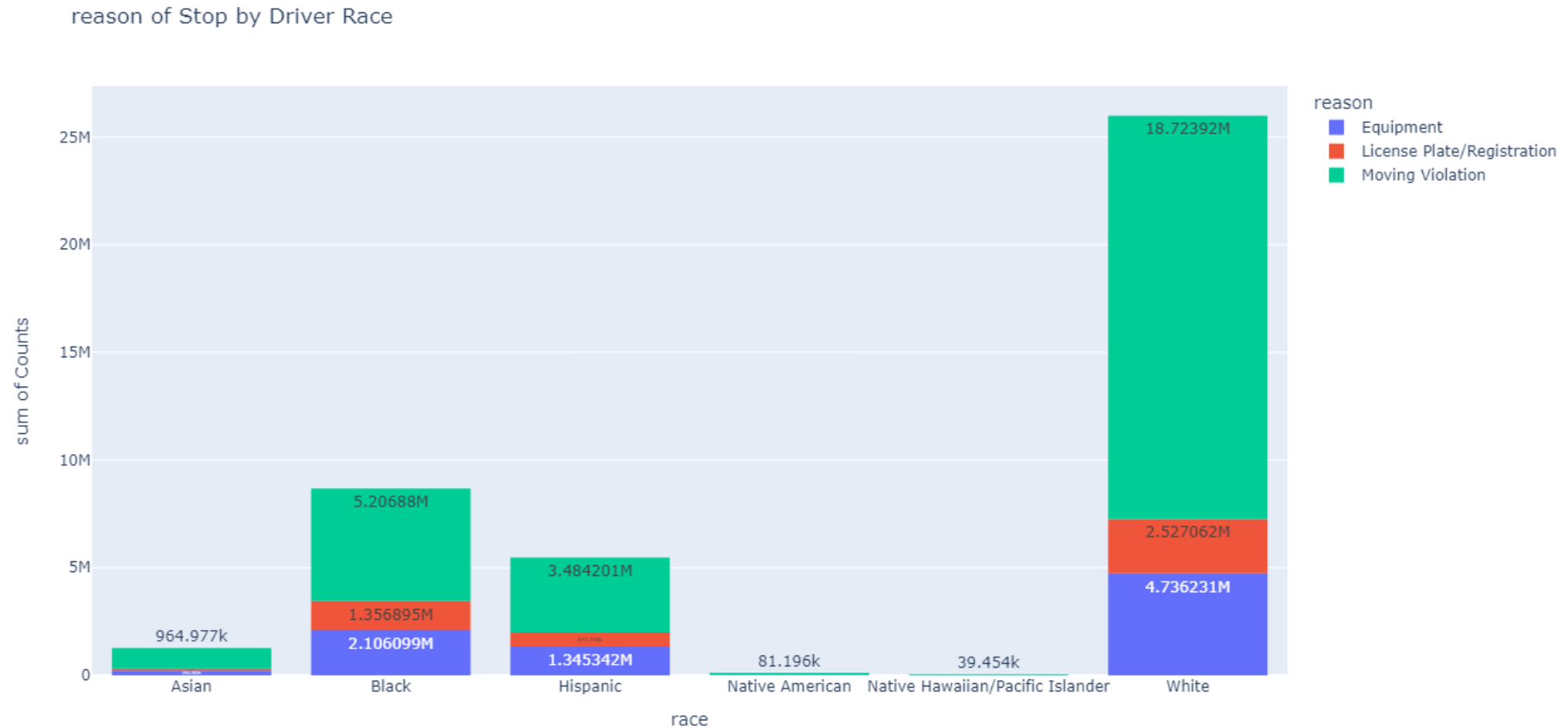
2. Histogram

a. Outcome of Stops by Driver Race:



2. Histogram

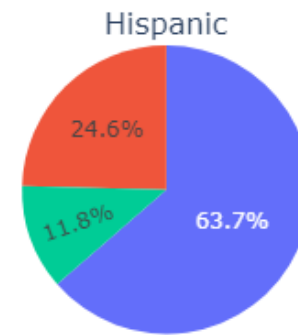
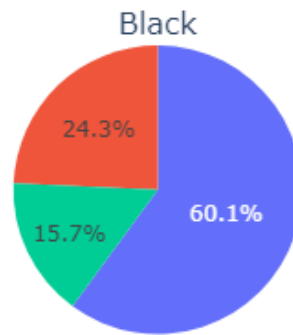
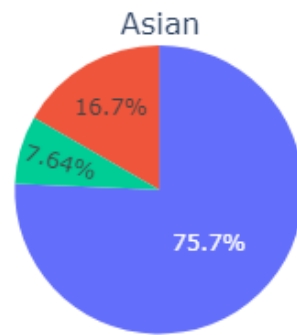
a. Reason for Stops by Driver Race



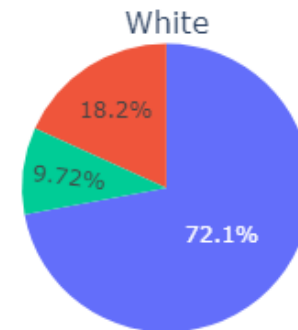
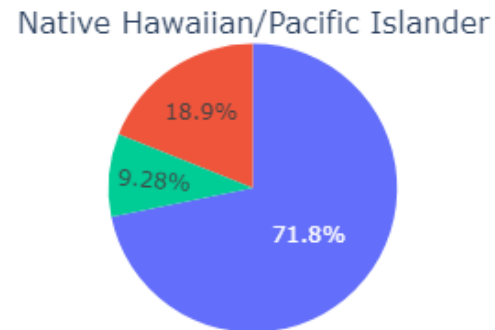
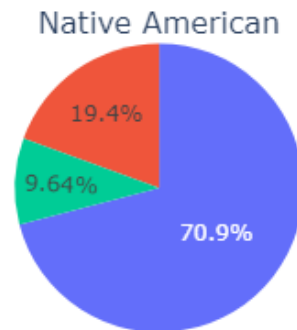
3. Pie Chart

a. Reason for Stops by Driver Race in All Area (IL)

reason by Driver Race (%) in All Area



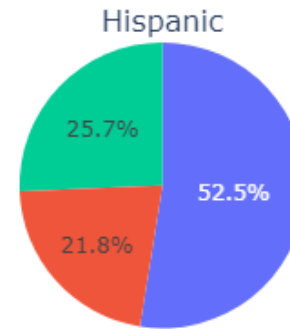
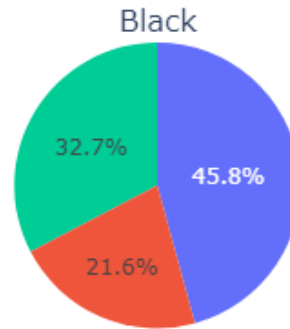
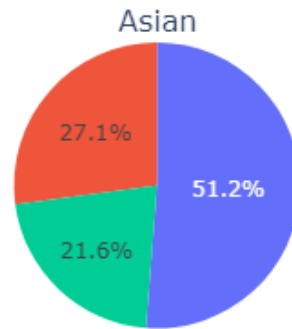
■ Moving Violation
■ Equipment
■ License Plate/Registration



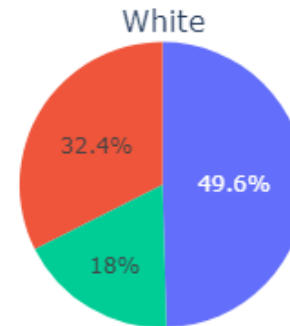
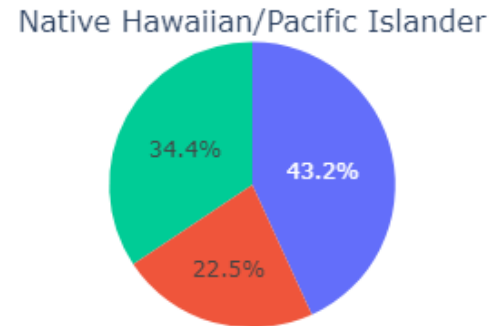
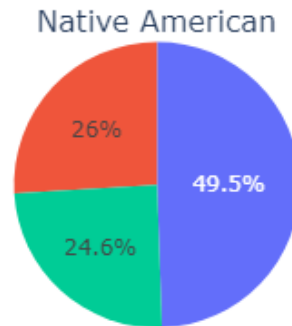
3. Pie Chart

b. Outcome of Stops by Driver Race in All Area (IL)

outcome by Driver Race (%) in All Area



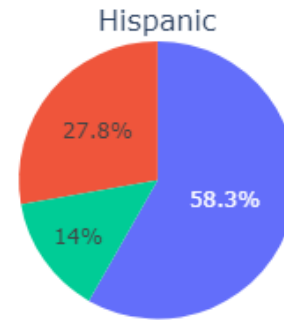
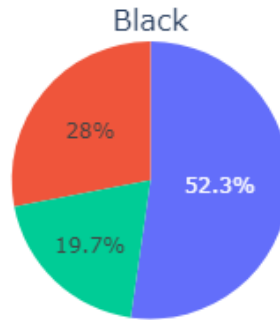
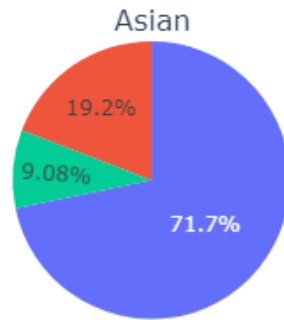
■ Citation
■ Written Warning
■ Verbal Warning



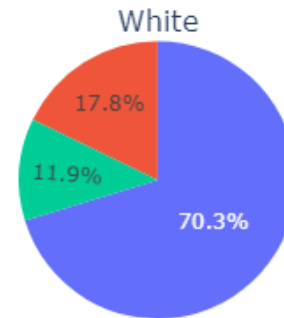
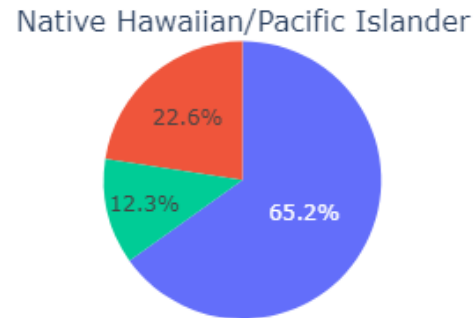
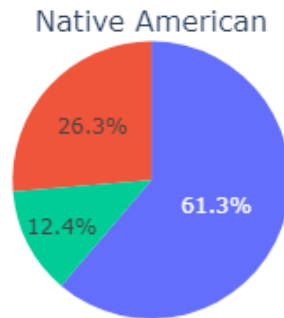
3. Pie Chart

c. Reason for Stops by Driver Race in only Chicago

reason by Driver Race (%) in Chicago



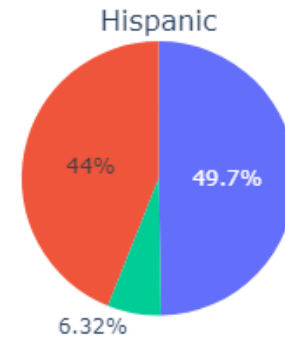
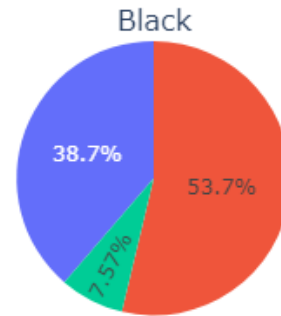
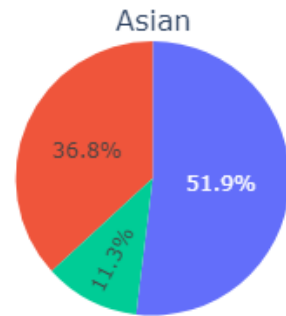
■ Moving Violation
■ Equipment
■ License Plate/Registration



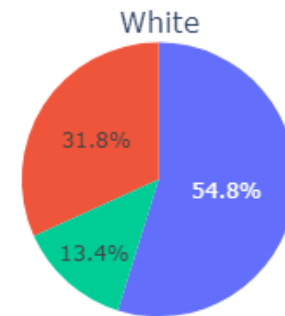
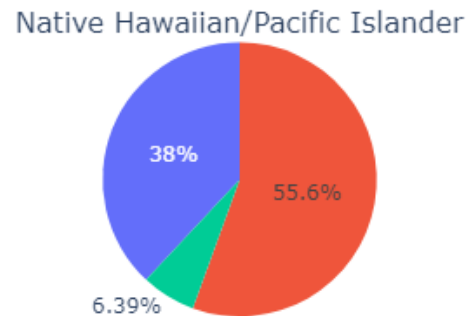
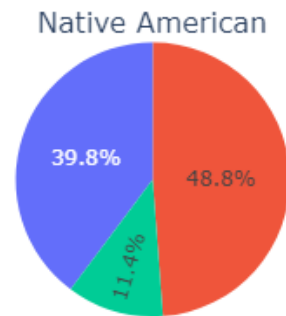
3. Pie Chart

d. Outcome of Stops by Driver Race in **only Chicago**

outcome by Driver Race (%) in Chicago



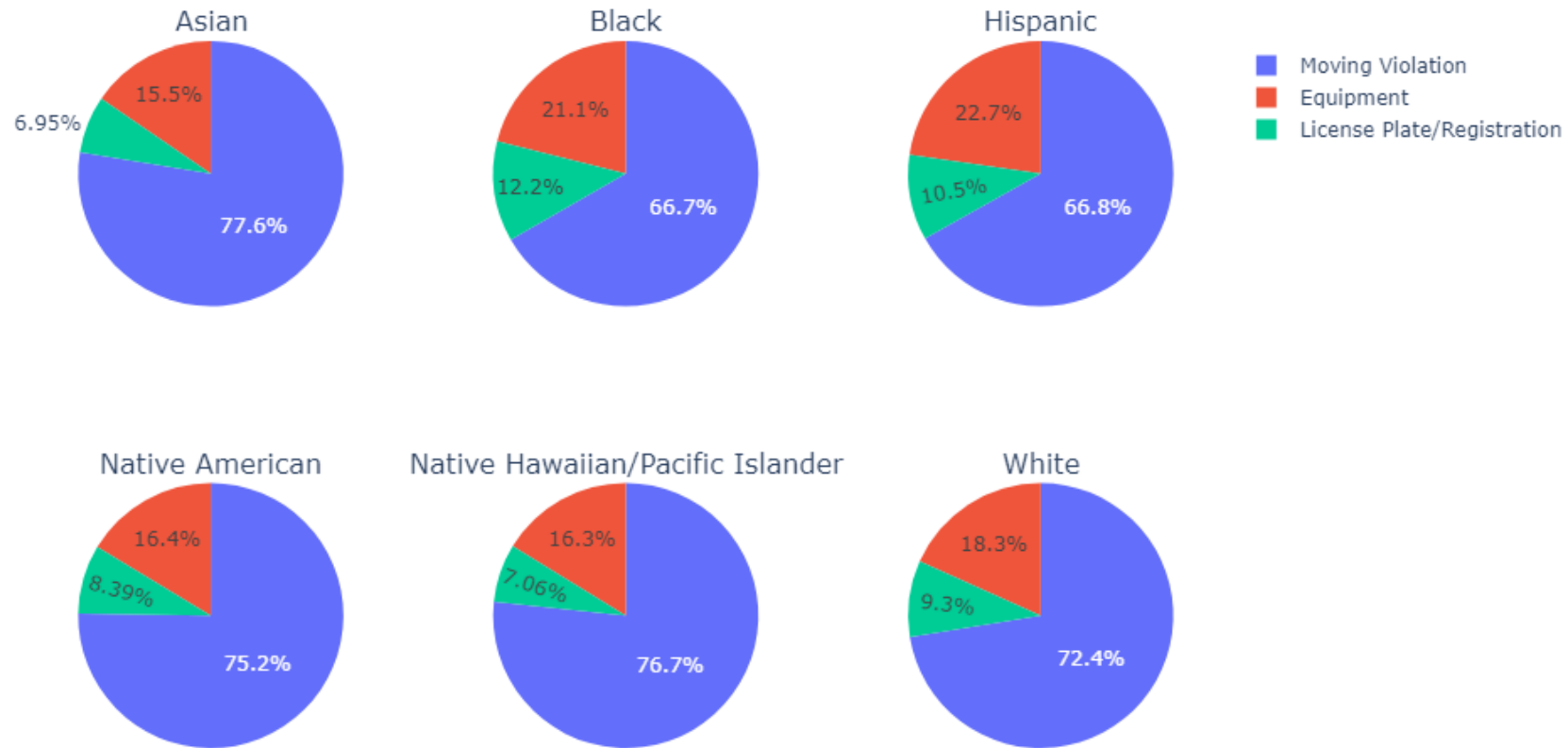
■ Citation
■ Verbal Warning
■ Written Warning



3. Pie Chart

e. Reason for Stops by Driver Race in other IL area

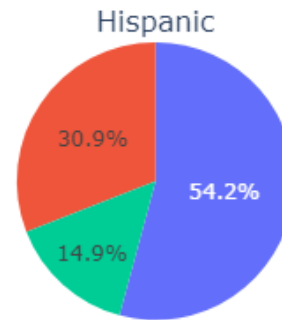
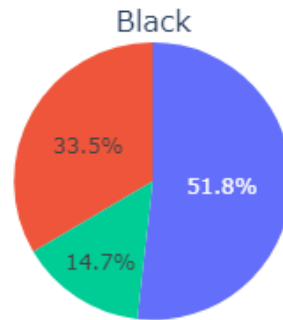
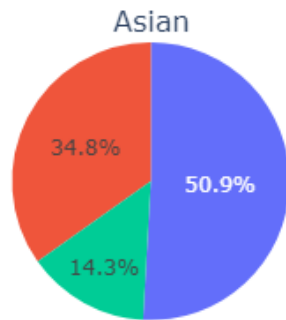
reason by Driver Race (%) in Other Area in IL



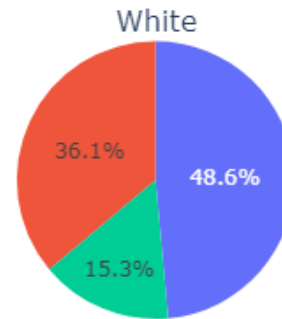
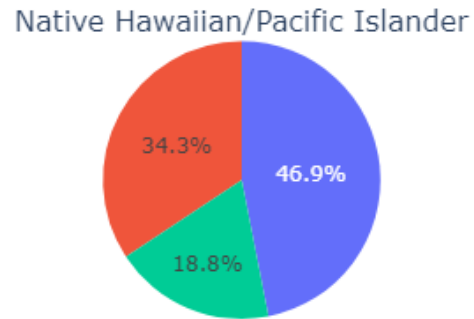
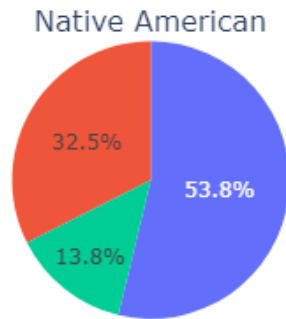
3. Pie Chart

f. Outcome of Stops by Driver Race in other IL area

outcome by Driver Race (%) in Other Area in IL

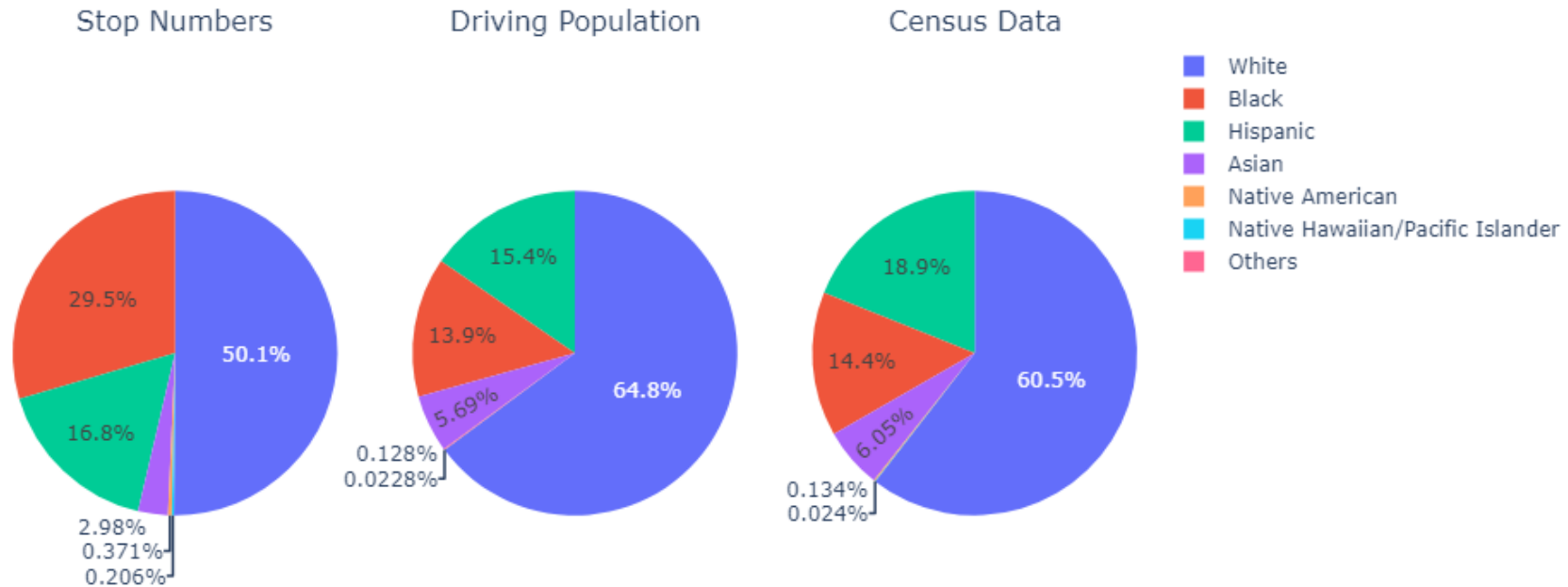


■ Citation
■ Written Warning
■ Verbal Warning



4. Comparison between Different Driving Population Estimates

Race by Proportion in 2020



5. Normalized Proportion of Driver Race (Comparison of Race Proportion between Stop Number and Driving Population) from 2019-2022

a. 2019



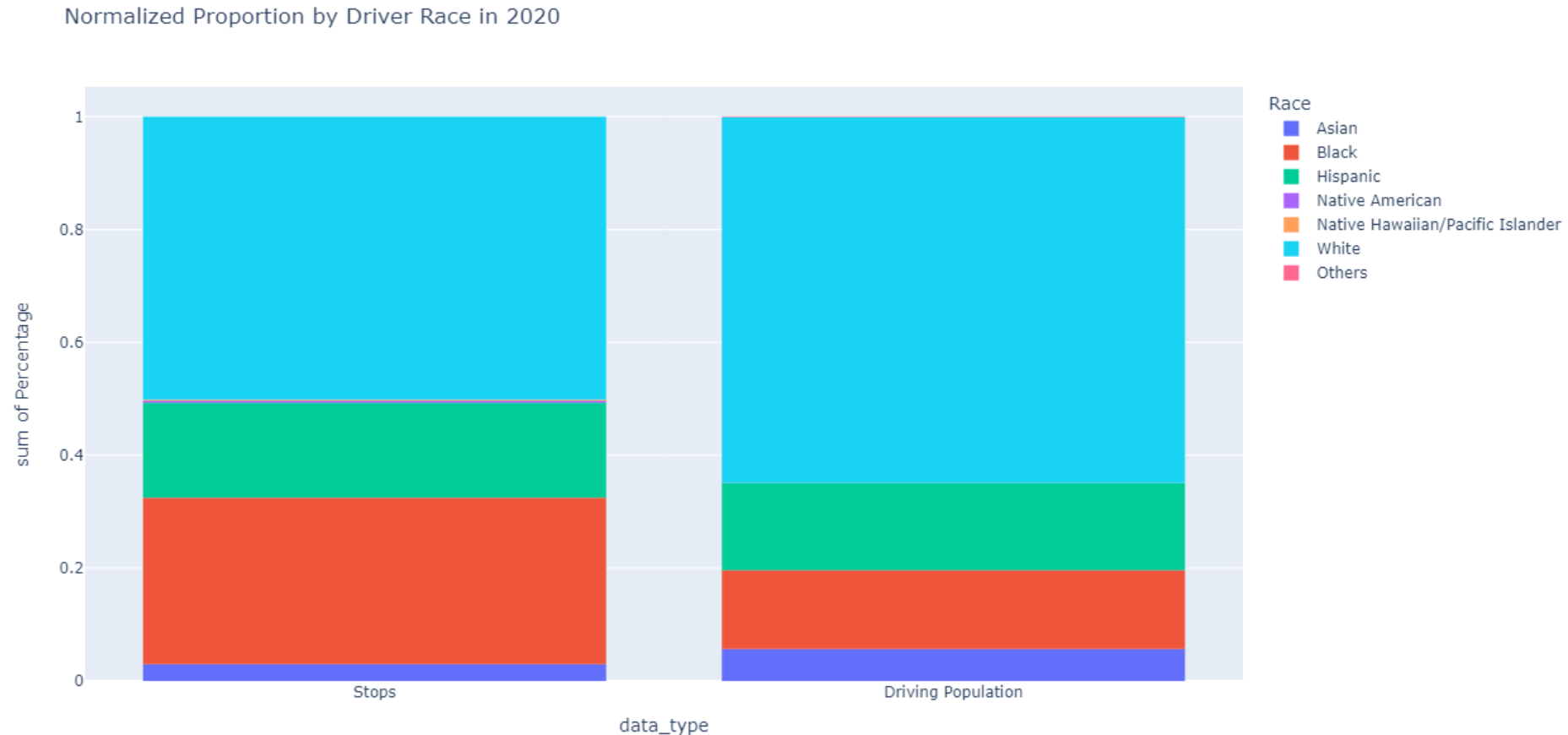
5. Normalized Proportion of Driver Race (Comparison of Race Proportion between Stop Number and Driving Population) from 2019-2022

b. 2020



5. Normalized Proportion of Driver Race (Comparison of Race Proportion between Stop Number and Driving Population) from 2019-2022

c. 2021



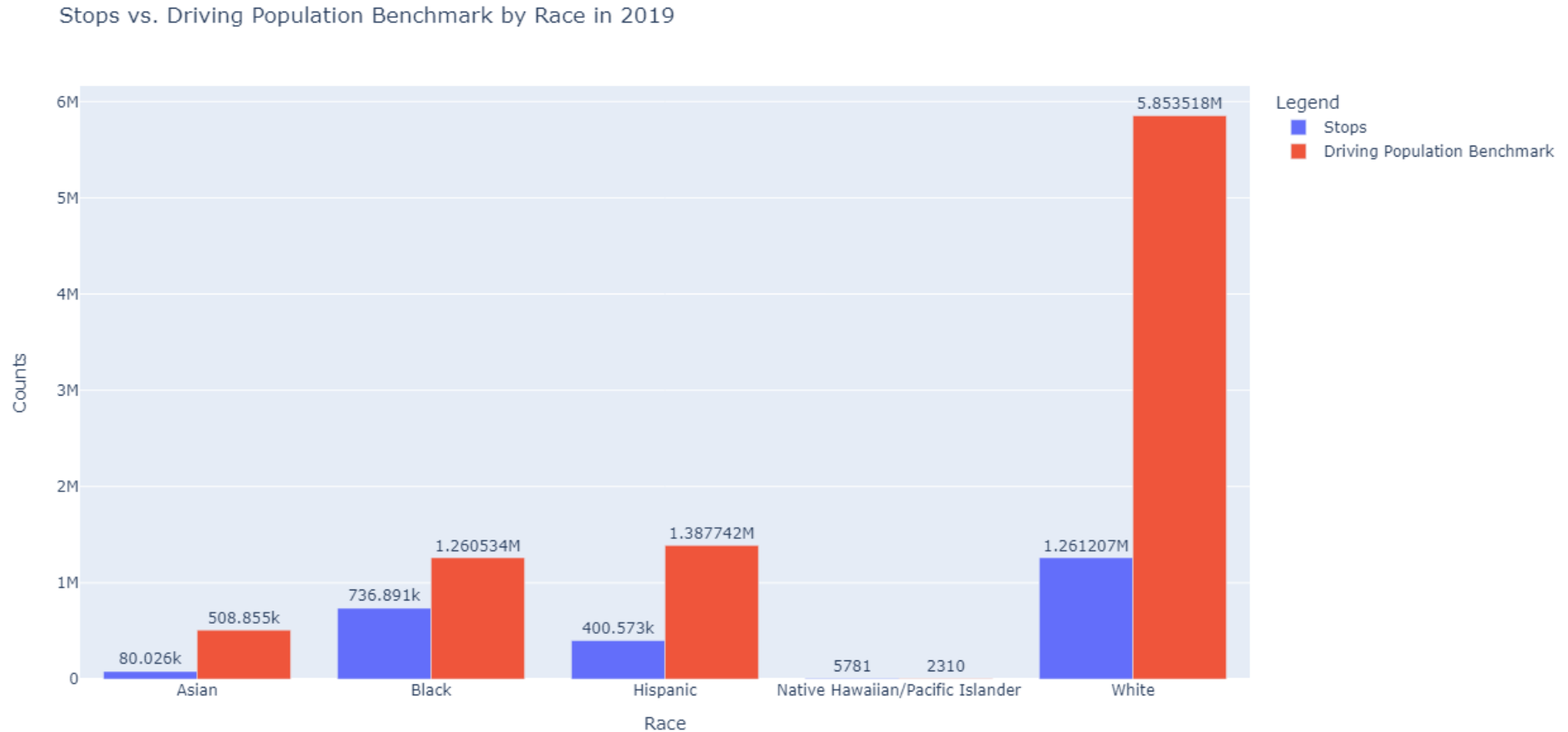
5. Normalized Proportion of Driver Race (Comparison of Race Proportion between Stop Number and Driving Population) from 2019-2022

d. 2022



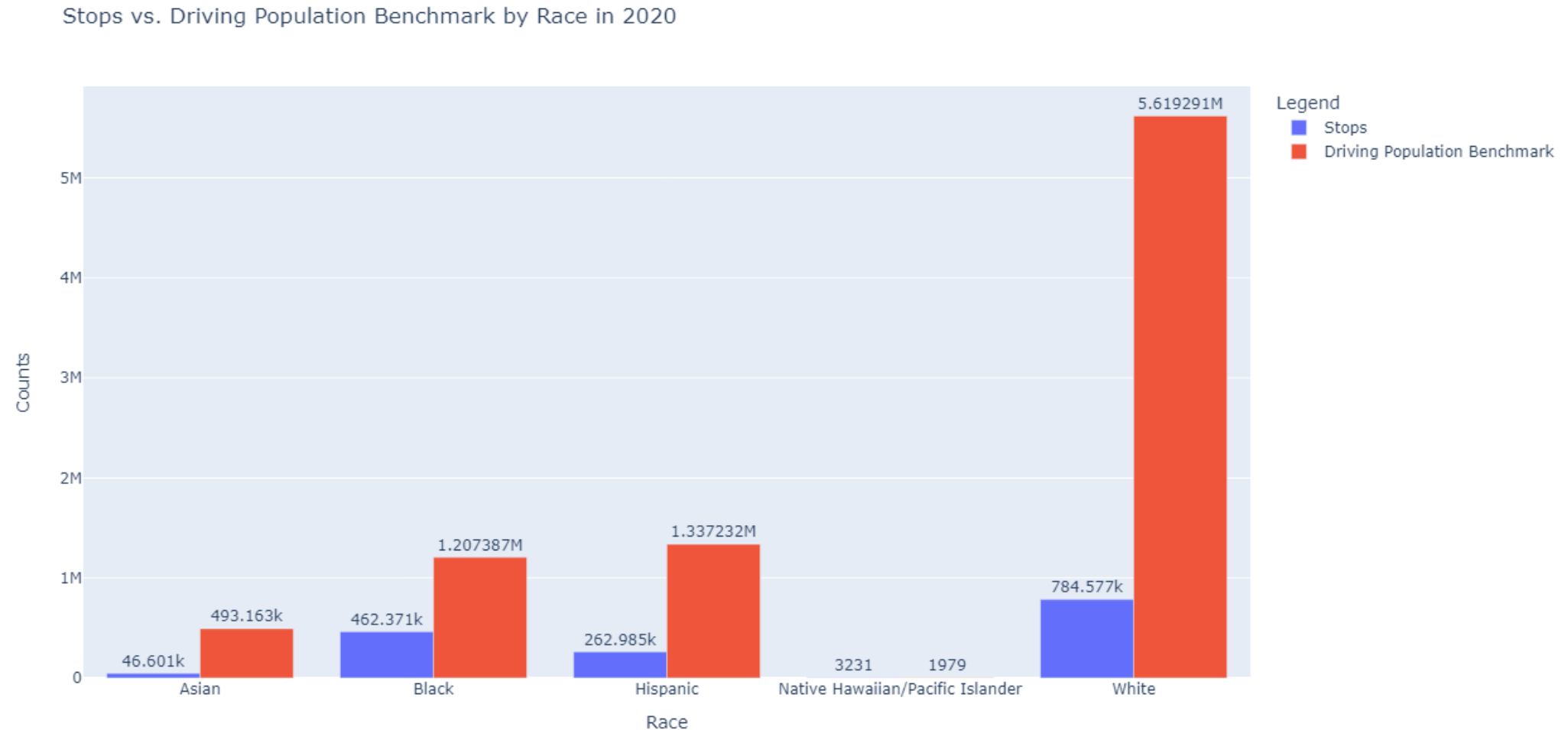
6. Side-by-side Bar Plot (Stops vs. Driving Population Benchmark by Race)

a. 2019



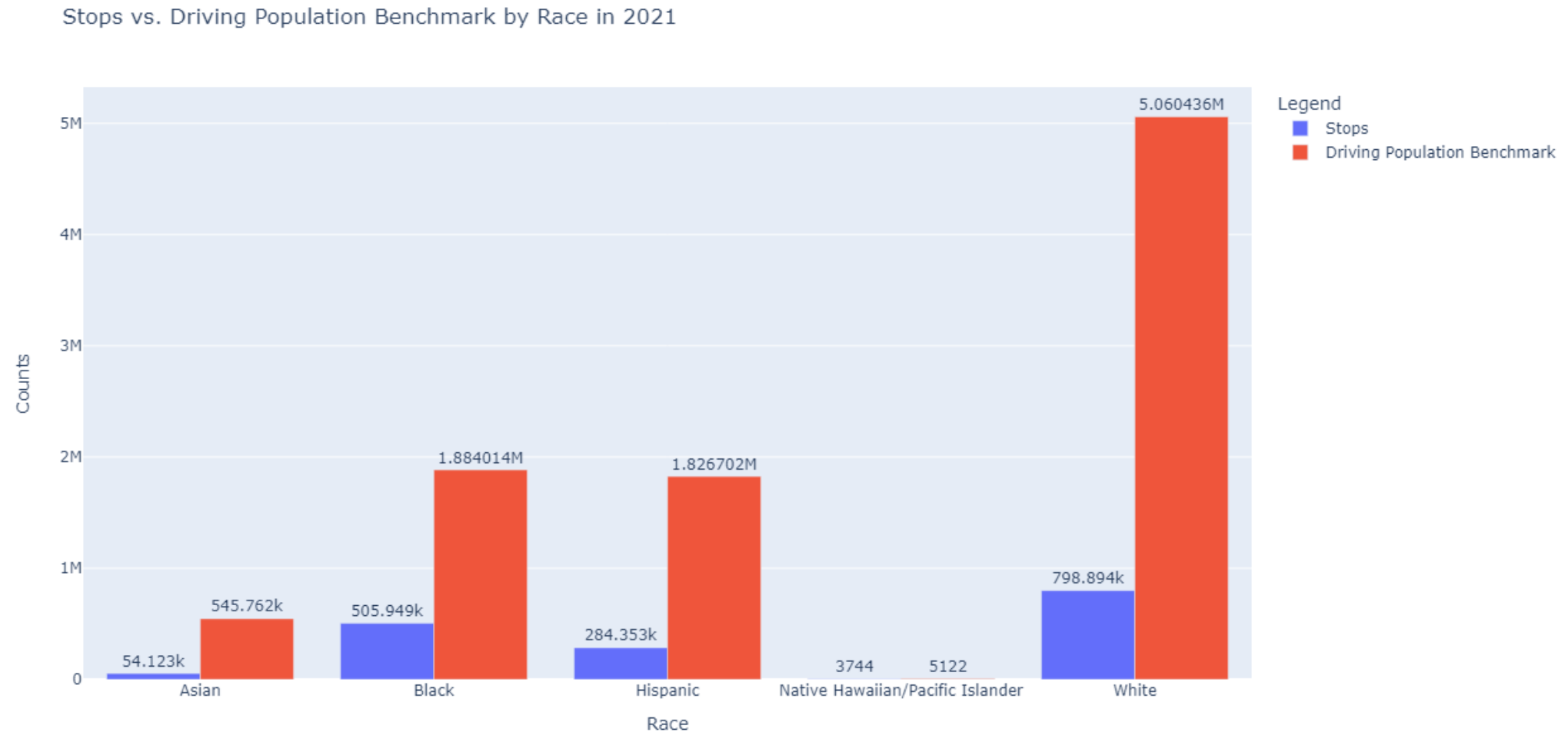
6. Side-by-side Bar Plot (Stops vs. Driving Population Benchmark by Race)

b. 2020



6. Side-by-side Bar Plot (Stops vs. Driving Population Benchmark by Race)

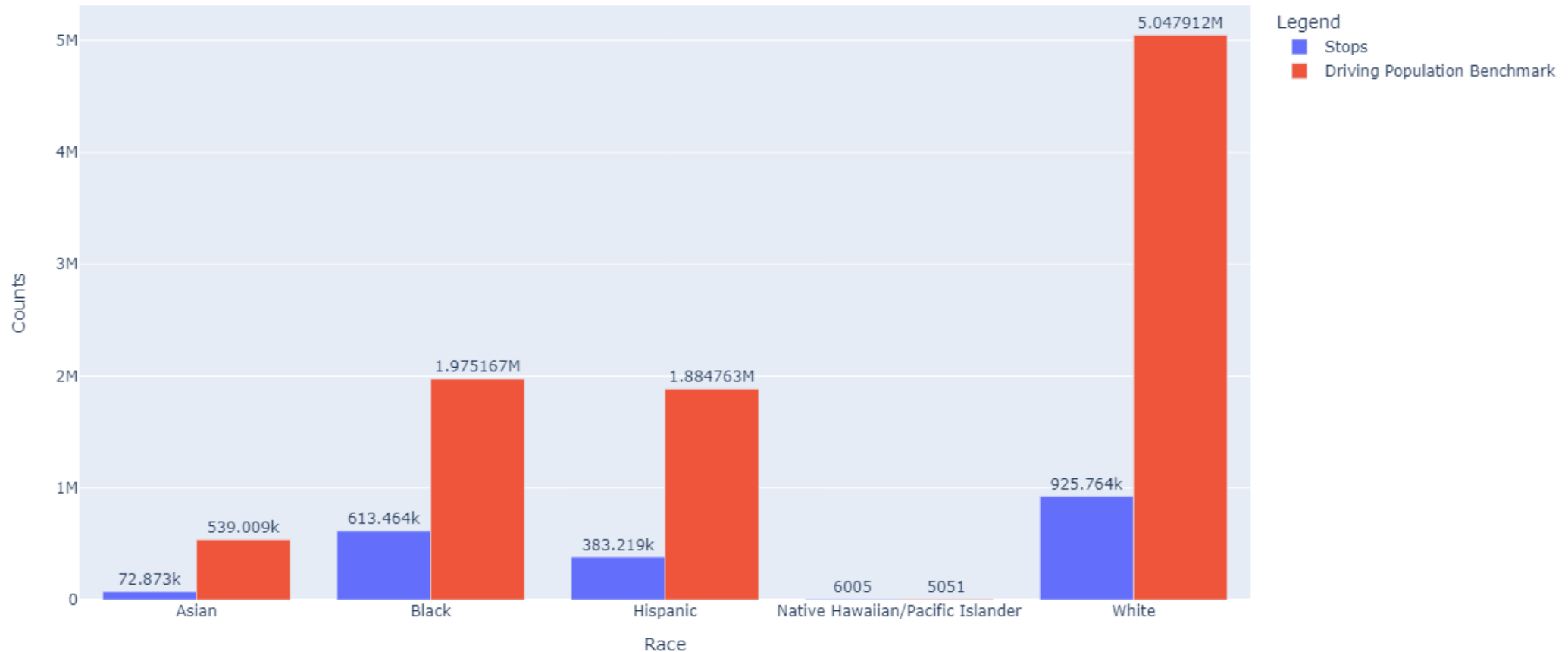
c. 2021



6. Side-by-side Bar Plot (Stops vs. Driving Population Benchmark by Race)

d. 2022

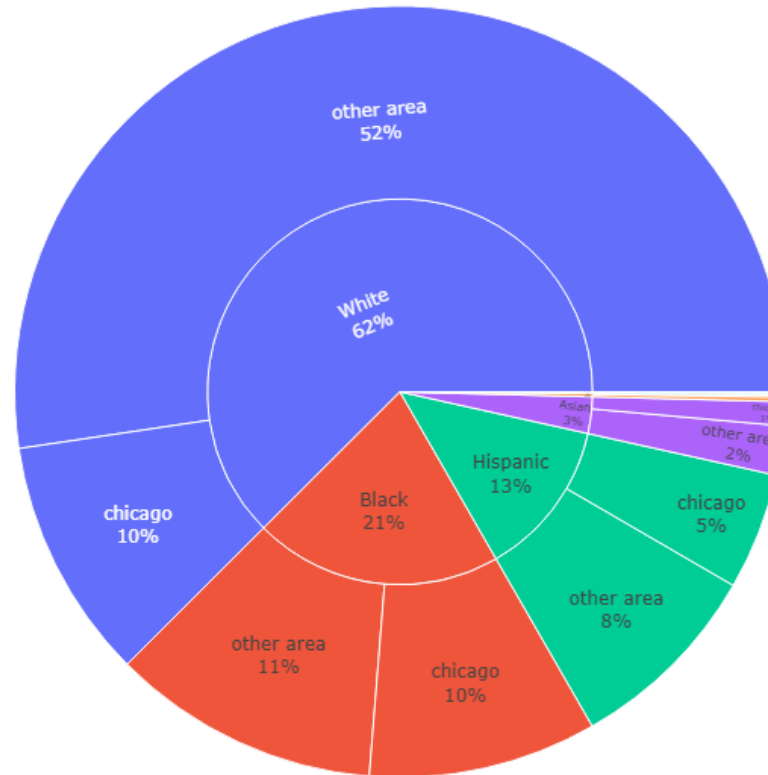
Stops vs. Driving Population Benchmark by Race in 2022



7. Sunburst Chart (Demonstrations of an Interactive Graph)

a. First Layer

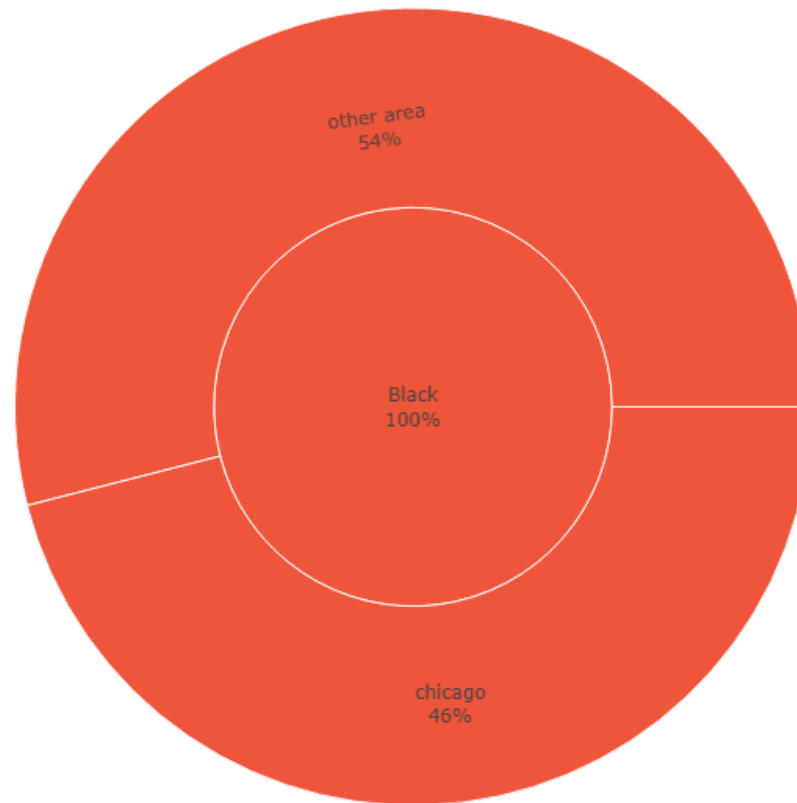
Sunburst Chart of Stop Outcomes by Race, Area, Age Group, and Gender
Explore the chart by selecting specific categories for each variable in every layer to observe the proportion.



7. Sunburst Chart (Demonstrations of an Interactive Graph)

b. Path: Black

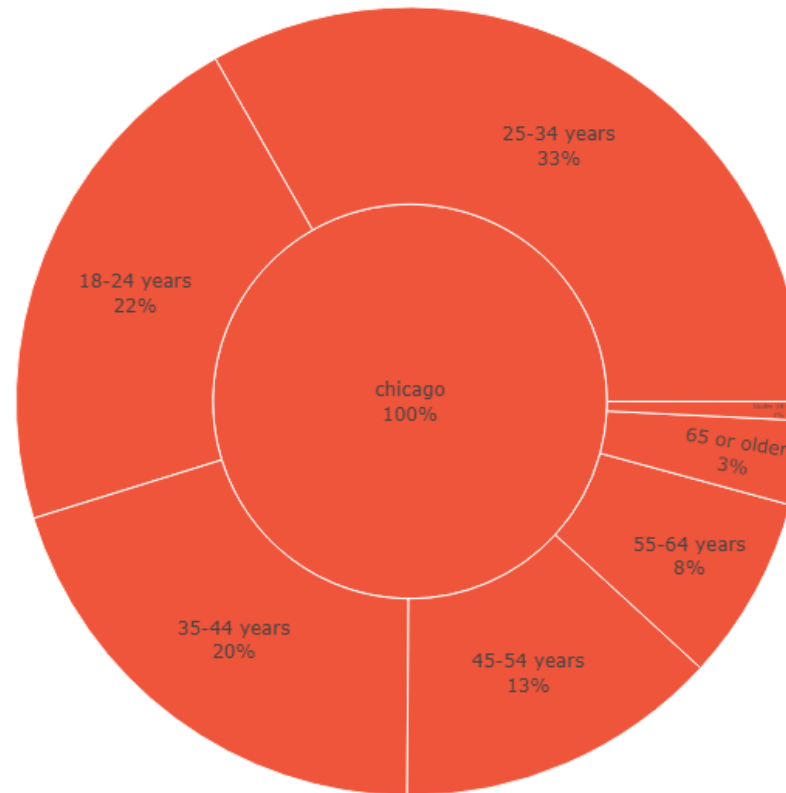
Sunburst Chart of Stop Outcomes by Race, Area, Age Group, and Gender
Explore the chart by selecting specific categories for each variable in every layer to observe the proportion.



7. Sunburst Chart (Demonstrations of an Interactive Graph)

b. Path: Black- Chicago

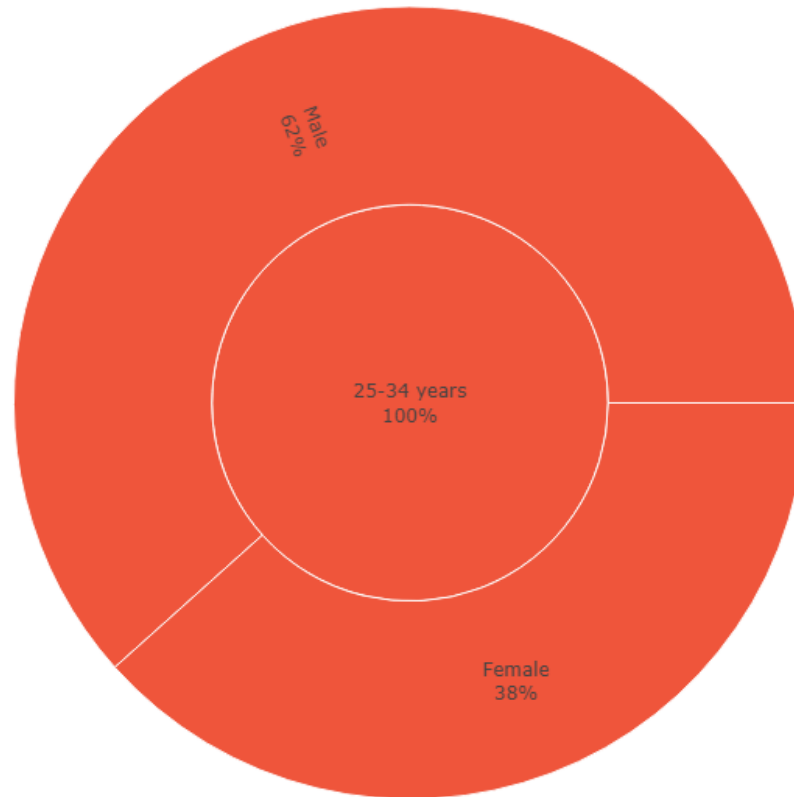
Sunburst Chart of Stop Outcomes by Race, Area, Age Group, and Gender
Explore the chart by selecting specific categories for each variable in every layer to observe the proportion.



7. Sunburst Chart (Demonstrations of an Interactive Graph)

b. Path: Black- Chicago- Age25to34

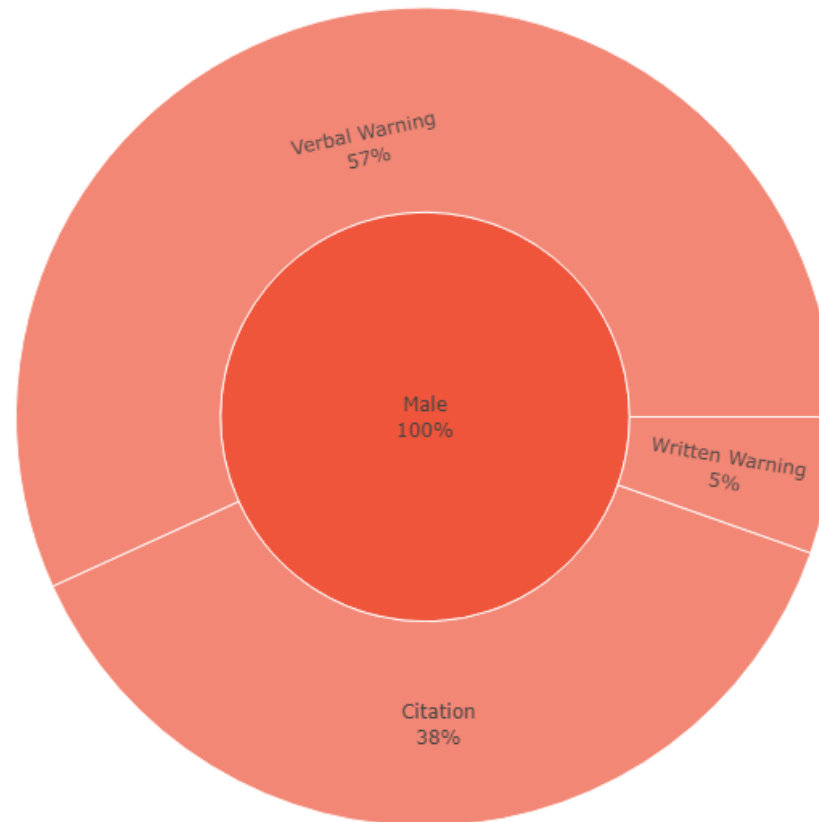
Sunburst Chart of Stop Outcomes by Race, Area, Age Group, and Gender
Explore the chart by selecting specific categories for each variable in every layer to observe the proportion.



7. Sunburst Chart (Demonstrations of an Interactive Graph)

b. Path: Black- Chicago- Age25to34- Male

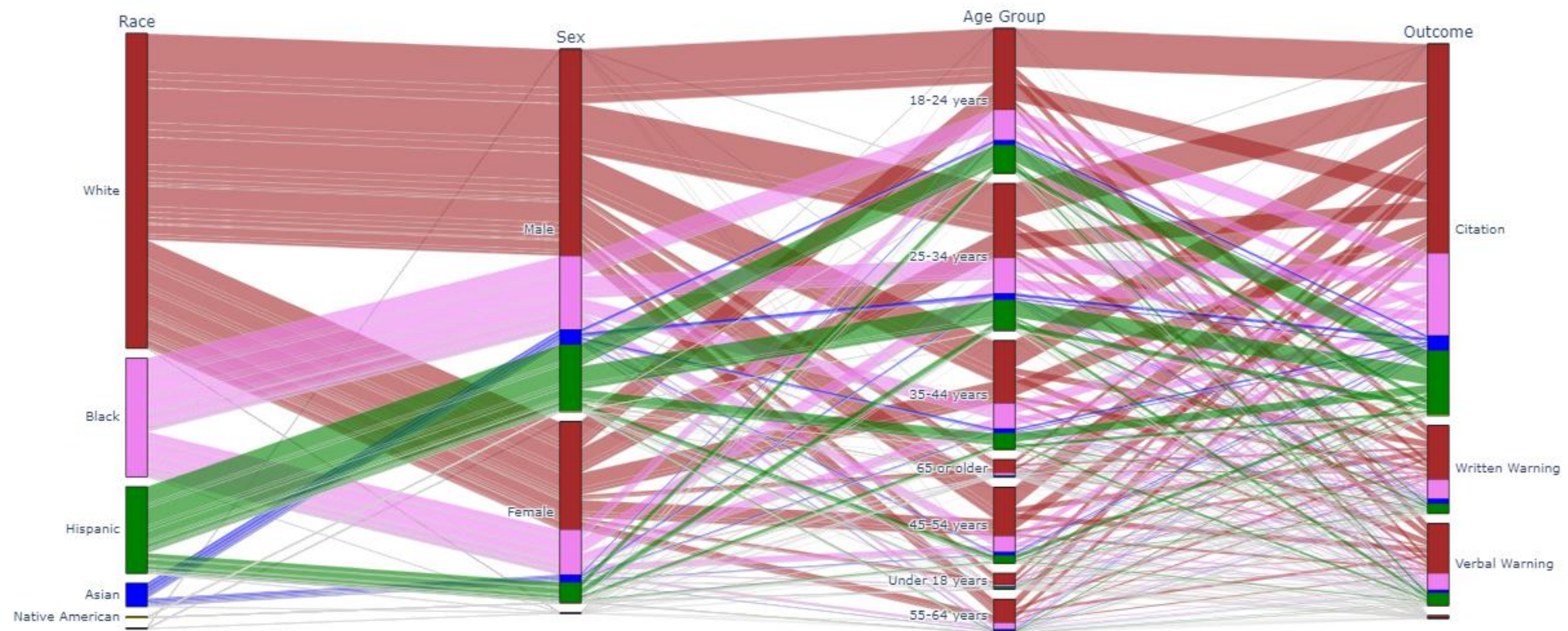
Sunburst Chart of Stop Outcomes by Race, Area, Age Group, and Gender
Explore the chart by selecting specific categories for each variable in every layer to observe the proportion.



8. Parallel Categories Diagram

a. Chicago, 2004:

Parallel Categories Diagram of Chicago in 2004



8. Parallel Categories Diagram

b. Other Area in IL, 2004

Parallel Categories Diagram of other area in 2004

