Visualization of Aviation Accident Dataset

The 21st century has witnessed rapid economic growth globally, as well as closer economic ties between states. As a result, the number of passengers requiring air travel has significantly increased, highlighting the importance of discussing the significance of data visualization in ensuring flight safety. In this project, we aim to explore the US flight accident dataset from 2000 to 2023 (Exclude) to better understand the factors that impact passenger safety under different circumstances. Ultimately, this will enable passengers to make informed decisions when selecting flights.

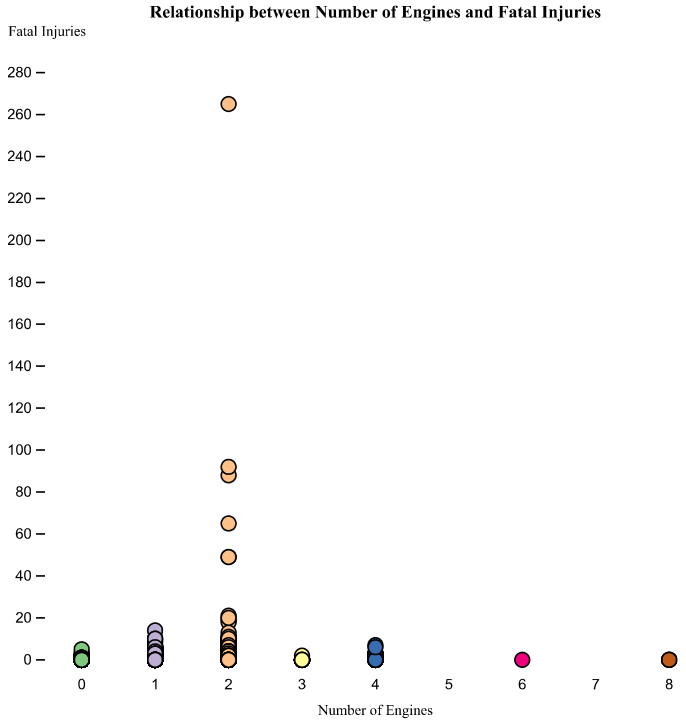
Does the number of aircraft engines affect the incidence of fatal injuries?

In the scatter plot below, it is apparent that in 21st century America, aircraft with two engines seem to have a higher frequency of producing fatal injuries in accidents compared to aircraft with a different number of engines. The most severe accident was American Airlines Flight 587, which according to Wikipedia, crashed near Belle Harbor in Queens, New York shortly after taking off from JFK International Airport on November 12, 2001, resulting in 251 passengers, 9 crew members, and 5 residents on the ground for a total of 265 fatalities. However, this accident is just an outlier, as most of the data points are clustered around zero. Out of several thousands of accidents and incidents, only a small number of flights have resulted in serious injuries or fatalities.

Color Scale: scaleOrdinal (Categorical Color Schema)

Marks: Points

Channels: Horizontal Position, Vertical Position, Color



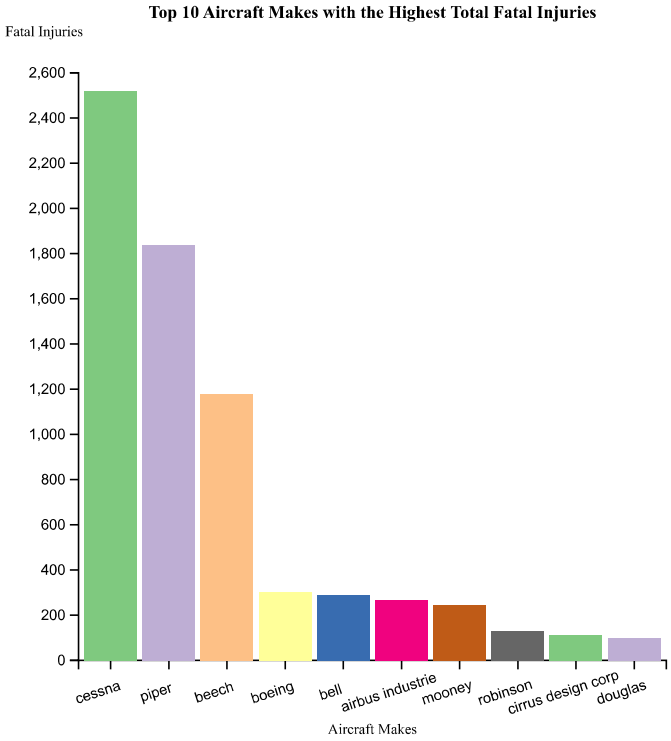
What are the top 10 aircraft brands with the highest number of fatal injuries?

Based on the second chart, it's apparent that "Cessna," "Piper," "Beechcraft," "Boeing," "Bell," "Airbus Industries," "Mooney," "Robinson," "Cirrus Design Corp," and "Douglas" are the ten aircraft manufacturers that have caused the most fatal injuries. However, out of these manufacturers, Cessna, Piper, and Beechcraft are responsible for the most fatalities, and they're known for specializing in the production of small general aviation aircraft. Although other companies are also listed, it's notable that these three firms have a significantly higher number of fatalities caused by their planes. Cessna is headquartered in Wichita, Kansas, while Piper is located in Florida. Beechcraft, which is based in Kansas, produces a variety of aircraft, including single- and twin-engine piston planes, turboprops, and business jets. It's worth mentioning that most of the aircraft produced by these companies are small-sized.

Color Scale: scaleOrdinal (Categorical Color Schema)

Marks: Lines

Channels: Horizontal Position, Vertical Position, Color



What is the variation of aviation accidents by month between 2000 and 2023?

Color Scale: scaleOrdinal (Categorical Color Schema)

Marks: Lines

Channels: Horizontal Position, Vertical Position, Color

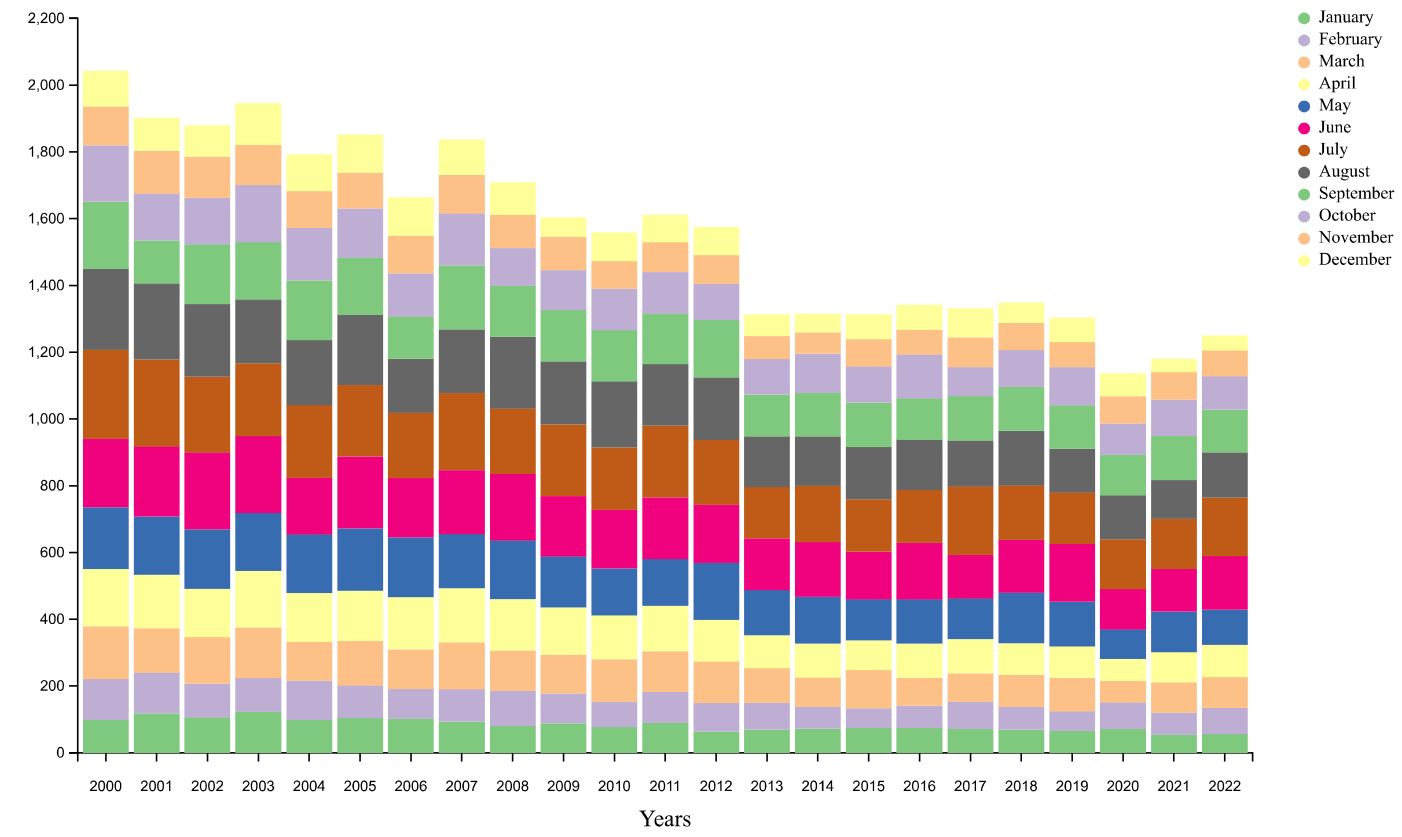
According to the Stacked Chart, it's evident that with the advancement of technology, aircraft manufacturers are now better equipped to provide passengers with a safer travel experience, resulting in a gradual decline in the number of accidents each year. From 2000 to 2023 (excluding the latter year), the top three years with the highest number of aviation accidents were 2000, 2003, and 2001, while the years 2020, 2021, and 2022 had the lowest number of accidents. This indicates that in today's globalized world, there has been an exponential growth in demand for air travel, prompting airlines to continuously improve and research flight safety. By examining the twelve months of the year, it's observed that accidents mostly occur during the summer months, with July and August having a higher number of aviation accidents compared to other months.

Color Scale: scaleOrdinal (Categorical Color Schema)

Marks: Lines

Channels: Horizontal Position, Vertical Position, Color

Monthly Aviation Accidents and Incidents between 2000 and 2023 (Excluding)



Sort By Counts

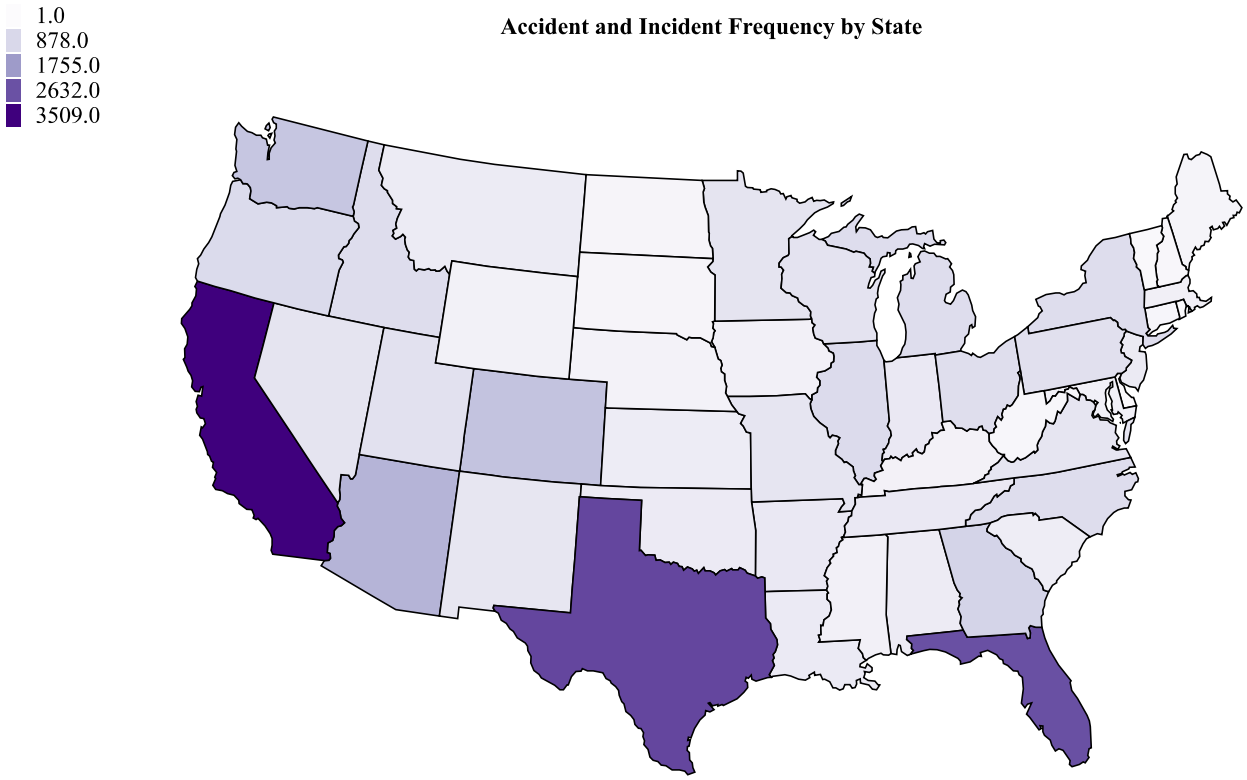
What is the difference in the number of aviation accidents among US states?

Based on the Geomap chart, it is clear that most flight accidents occur in three highly populated Southern states: California, Texas, and Florida. These states are also the three most populous states in the US. New York, which is the fourth most populous state and has a population slightly smaller than Florida, ranks considerably lower in terms of flight incident frequency.

Color Scale: scaleSequential (Sequential Color Schema)

Marks: Areas

Channels: Horizontal Position, Vertical Position, Size, Color, Shape



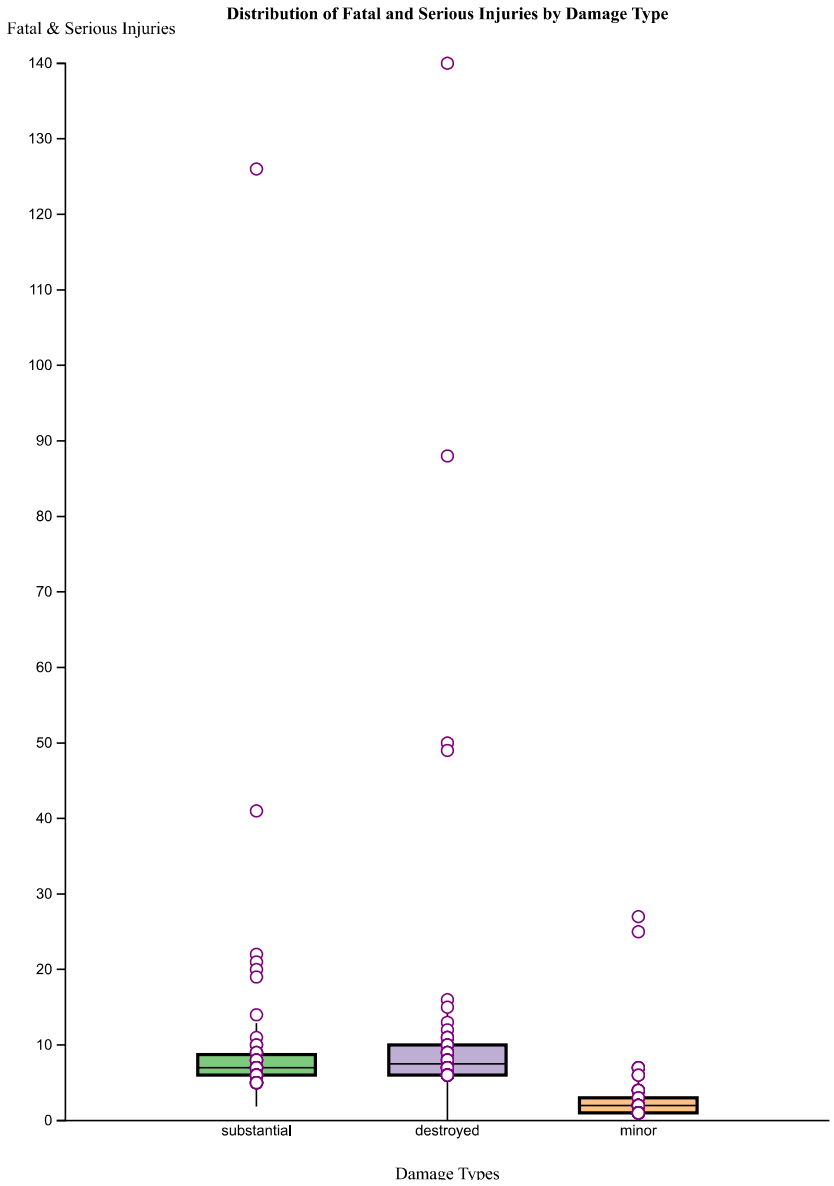
What is the distribution of fatal and serious injuries based on damage type?

The fifth chart shows that the number of people who sustain serious injuries is similar when an aircraft experiences destroyed or substantial damage, but higher compared to when it sustains only minor damage. Specifically, the median number of seriously injured people is close to 7 when an aircraft is destroyed, which is similar to substantial damage. However, when the aircraft experiences minor damage, the median number of seriously injured people is close to 2. Additionally, in cases where the aircraft incurs only minor damage, the number of injuries resulting from the accident is typically close to 0. Based on thousands of flight accidents, it is evident that passengers are relatively safe even if the aircraft sustains only minor damage, as long as the damage is not severe or catastrophic.

Color Scale: scaleOrdinal (Categorical Color Schema)

Marks: Points, Lines

Channels: Horizontal Position, Vertical Position, Color, Size



Are aviation accidents/incidents related to weather conditions?

VMC and IMC are terms used in aviation to describe different weather conditions and visibility that pilots may encounter during flight. The key difference between VMC and IMC in aviation is that VMC refers to flight conditions in which pilots can operate the aircraft by visual references, while IMC refers to flight conditions in which pilots must rely solely on instrument readings to navigate and control the aircraft. According to the pie chart in our sixth graph, it is evident that most flight accidents occur in high visibility weather conditions, and only a small proportion of flight accidents occur in IMC weather conditions.

Color Scale: scaleOrdinal (Categorical Color Schema)

Marks: Areas

Channels: Color, Size

Accident and Incident Frequency by Weather Condition