Aviation Accident Analysis

Project overview

- My analysis of the aviation accident dataset revealed valuable insights into safety patterns and trends. Employing various visualization techniques, i uncovered significant relationships between different factors influencing aviation safety.

- These visualizations included:
  - ➢ distributions of injuries under different weather conditions
  - ➢ fatal injury counts
  - ➢ relationships between engine count and fatal injuries
  - ➢ distributions of fatal injuries by aircraft category and flight phase.

- These analyses provided crucial data-driven insights for your company's new aviation division, informing decisions on aircraft acquisition, operational strategies, and safety measures.

- The findings from your investigation contribute significantly to enhancing safety standards in your future aviation endeavors. By identifying correlations between various factors such as weather conditions, aircraft design (engine count), and flight phases, you've highlighted potential risks associated with different aspects of the business. This data-driven approach ensures that your company can make informed decisions based on empirical evidence rather than assumptions, potentially leading to improved safety protocols and reduced risk in your operations.

Data understanding

- I was working with a large dataset containing aviation accident information from 1962 to 2023. The dataset has 90,348 rows and 31 columns, giving us a wealth of information to explore.

- To gain deeper insights, i employed several visualization methods:

    ➢ Distribution of injuries across different weather conditions (bar chart)

    ➢ Fatal injury counts (pie chart)

    ➢ Relationship between the number of engines and fatal injuries (scatter plot)

    ➢ Fatal injuries distribution by aircraft category (bar plot)

    ➢ Injury distribution by flight phase (bar plot)

Data analysis

Methodology

- Employed exploratory data analysis techniques
- Created interactive visualizations to gain deeper insights
- Focused on key aspects of aviation safety:
  - ➢ Weather conditions' impact on accidents
  - ➢ Accident severity (fatal vs. non-fatal)
  - ➢ Relationship between engine count and safety
  - ➢ Variations in safety across different aircraft categories
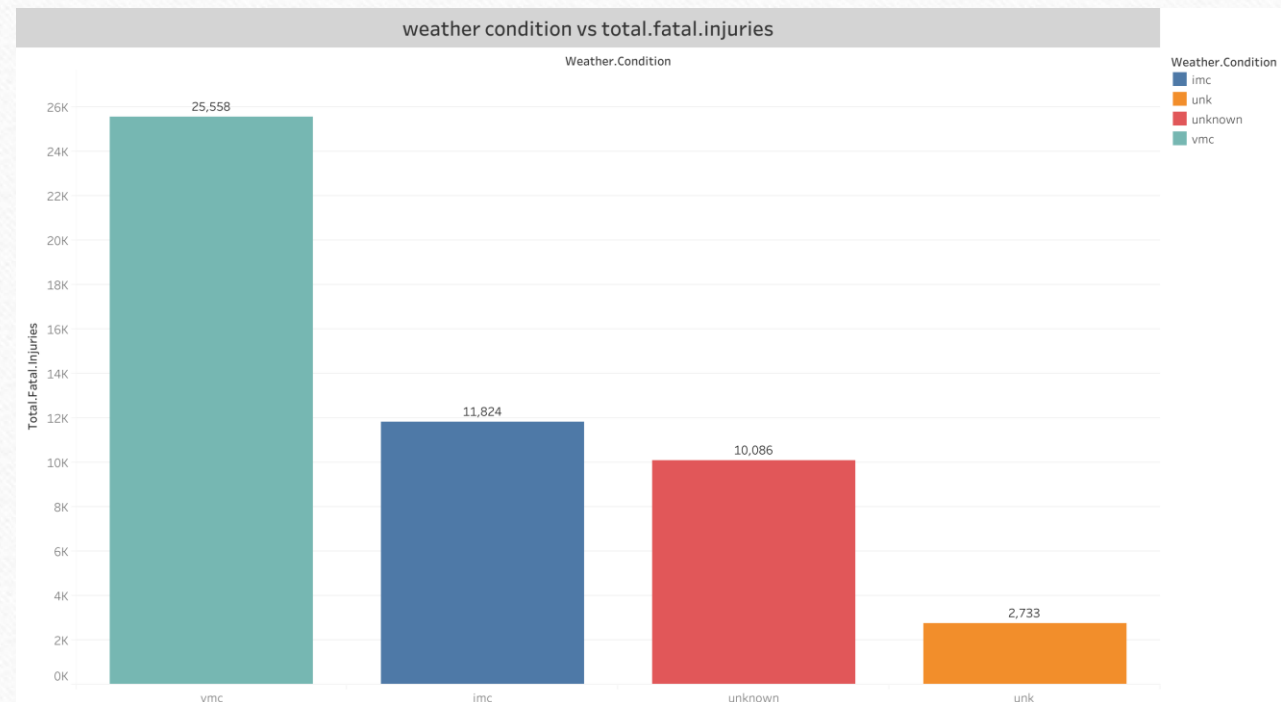 - ➢ Injury patterns during different flight phases

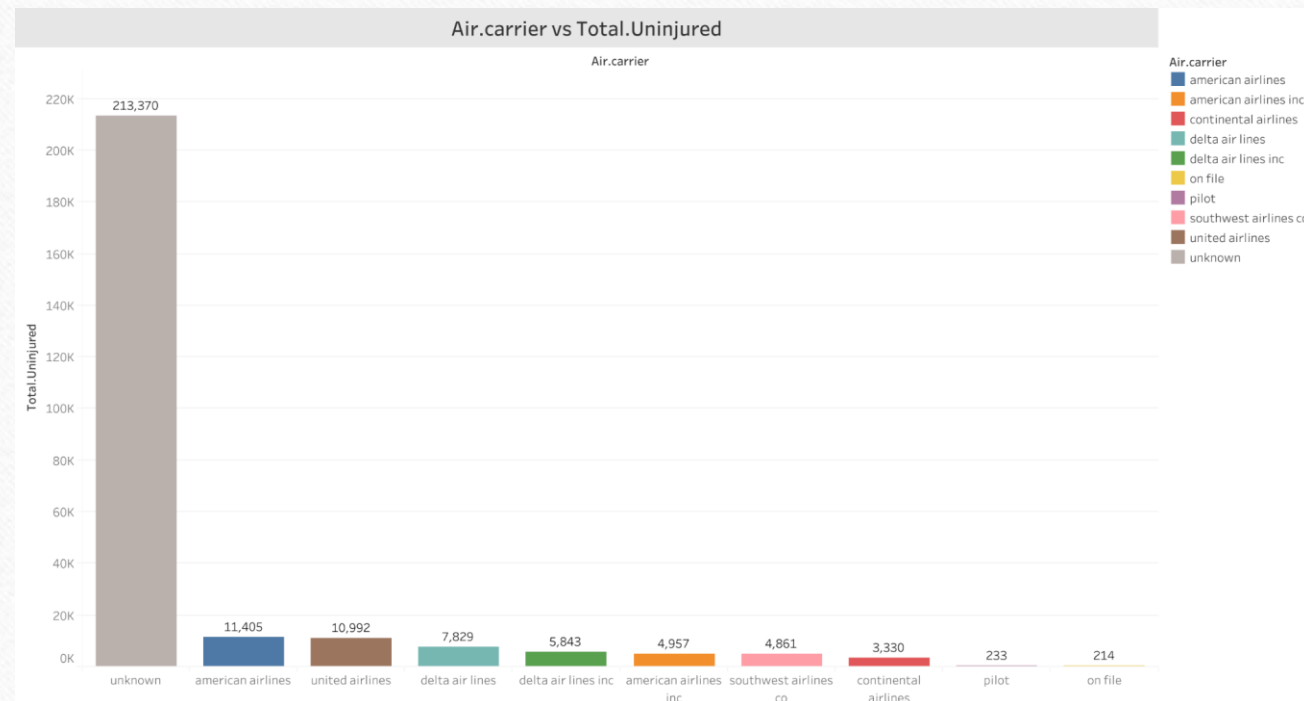# Relationship between location and fatal injuries
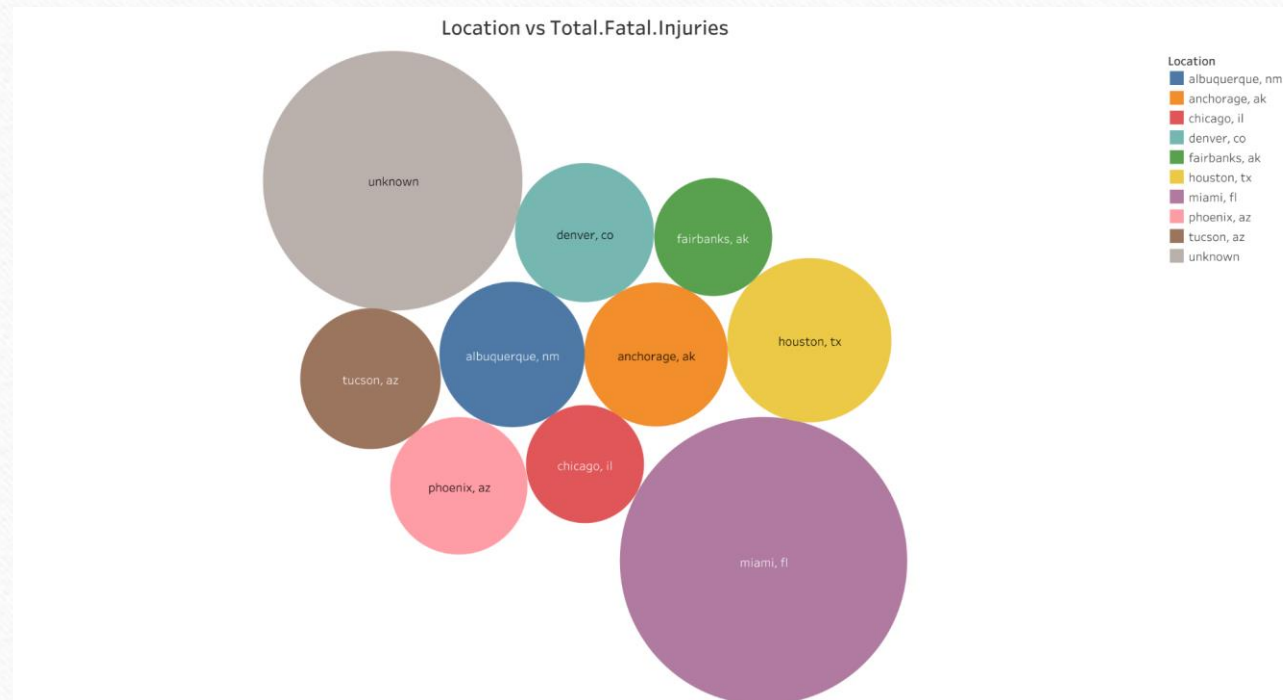
Relationship between model and tota serious injuries
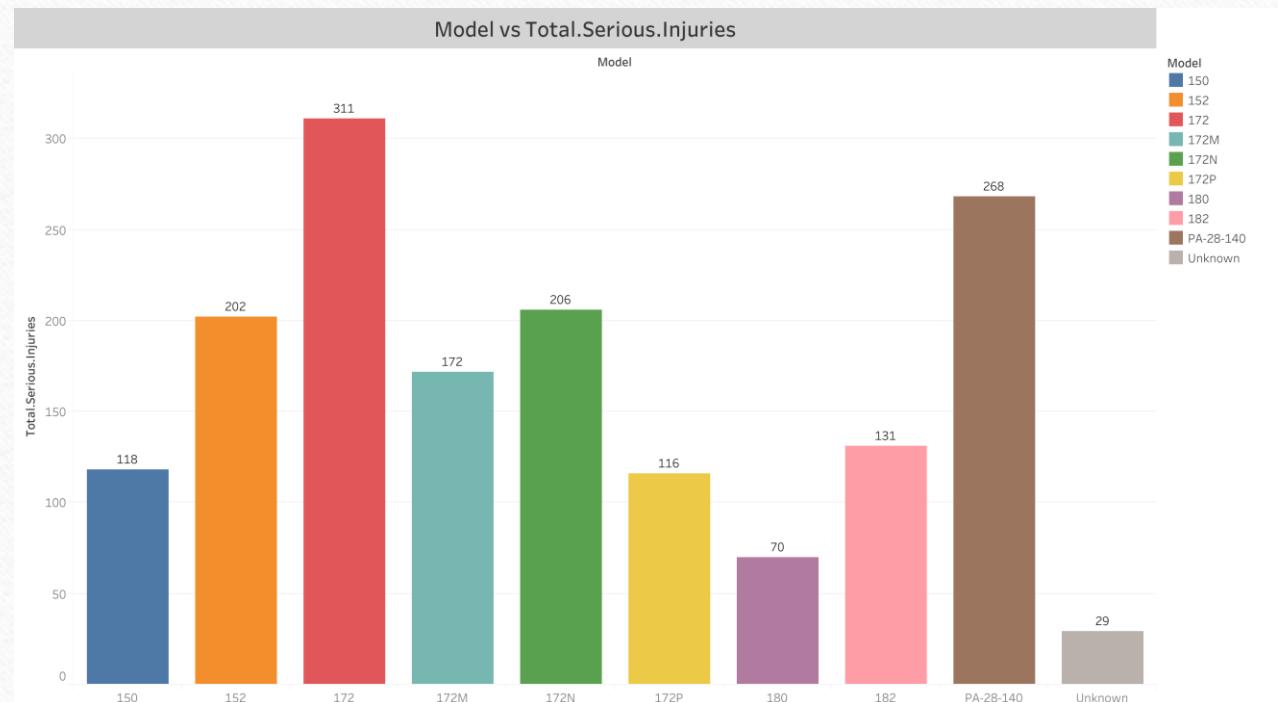
Relationship between weather and total fatal injuries

Relationship between air carrier and total uninjured

Recommendations:

1. Invest in Multi-Engine Aircraft: Given the correlation between the number of engines and fatal injury counts, prioritize acquiring multi-engine aircraft for your fleet. This investment aligns with the trend of improved safety profiles in multi-engine planes, potentially reducing overall risk and enhancing your company's safety reputation.

2. Implement Weather-Specific Safety Protocols: Utilize the insights from your analysis on injury distributions across different weather conditions to develop tailored safety procedures. Create comprehensive checklists and training programs for pilots and ground staff to address the unique challenges posed by adverse weather conditions, thereby minimizing the impact of weather-related accidents.

3. Focus on Critical Flight Phases: Based on the noted disparities in injury rates during different phases of flight, allocate additional resources to improve safety standards during these high-risk periods. Develop specialized training modules and invest in advanced technology systems designed to enhance situational awareness and control capabilities during takeoff, landing, and other critical phases of flight.

Next steps:

To further refine this analysis and provide actionable insights:

- Quantitative Analysis:
  - Calculate exact percentages of fatal vs. non-fatal injuries.
  - Determine the average number of fatal injuries per accident.
  - Identify top 3-5 aircraft categories by fatality rate.
- Risk Assessment:
  - Develop a risk score for each aircraft category based on fatality rates and frequency of accidents.
  - Create a heatmap showing risk levels across different aircraft categories and flight phases.
- Correlation Analysis:
  - Investigate correlations between weather conditions and specific types of accidents or injuries.
  - Examine relationships between aircraft age, maintenance history, and accident rates.

THANK YOU.

Name: Ann Mwangi

LinkedIn profile: @ann-mw