

RISKY WINGS!

Identifying Safer Aircraft Through Data



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Business Problem

Our company is entering the aviation industry with plans to purchase aircraft for both commercial and private operations. However, we currently lack insight into the potential safety risks associated with different aircraft makes and models.

To make informed investment decisions, we need a data-driven analysis to identify aircraft with the lowest safety risk.

Project Objective

Objectives:

- To support strategic decision-making by identifying low-risk aircraft makes and models using historical accident data.
- To make informed investment decisions, we need a data-driven analysis to identify aircraft with the lowest safety risk.

Project Goal

Goals of the Analysis:

- Assess accident frequency and severity across aircraft types
- Calculate key safety metrics (fatality and injury rates)
- Highlight aircraft that pose lower safety risks for commercial and private use
- Deliver actionable insights to guide aircraft purchasing decisions

Data Source

Source:

- [Aviation Accident Database Synopses on Kaggle](#)
- Compiled from data by the National Transportation Safety Board (NTSB)

The dataset includes :

- Accidents and Incident reports
- Number of fatal and non –fatal accidents
- Aircraft Make and Model

Tools and Methods used

Data collection and cleaning:

- Python – Utilize libraries such as Pandas for data manipulation and visualization.
- Tableau – Created interactive dashboard
- Matplotlib and Seaborn – Used for visualization within Jupyter notebook.

Analysis Approach

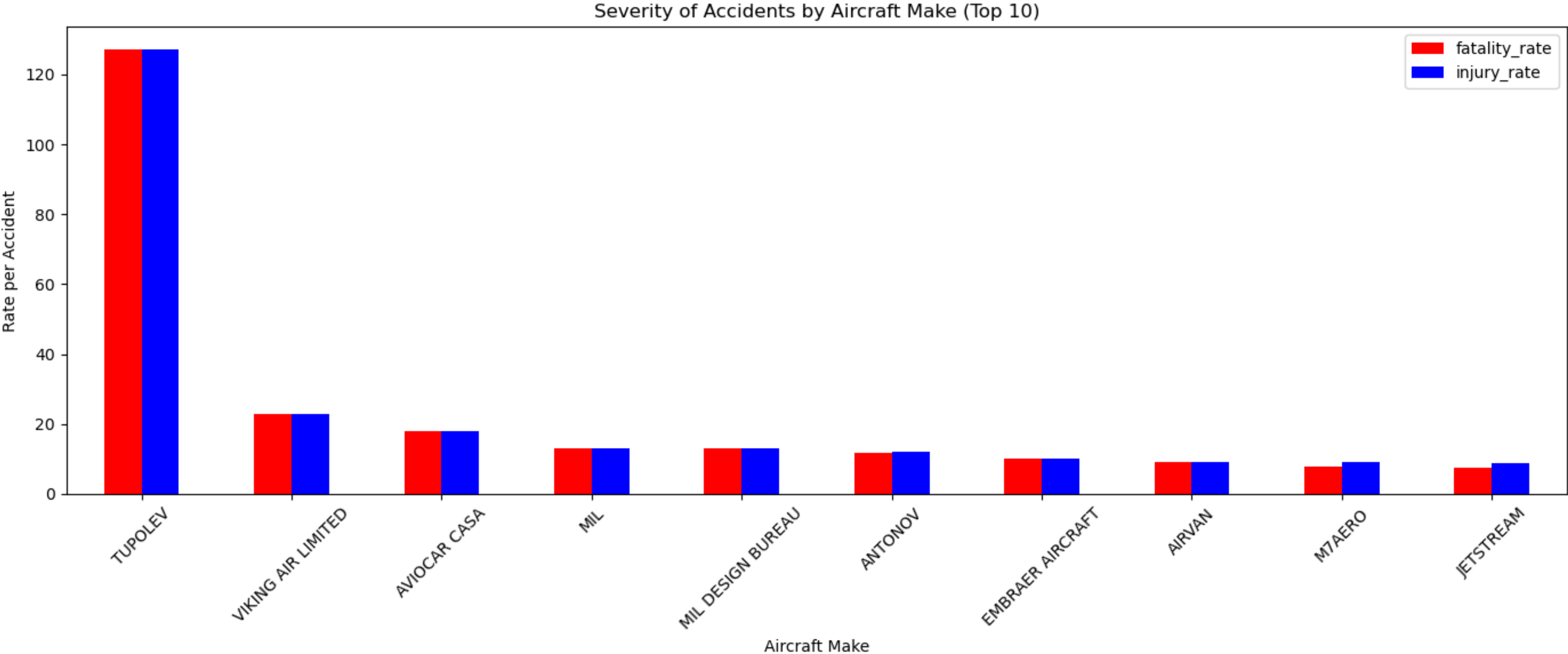
Types of Analysis:

- Descriptive Statistics – To summarize and describe patterns in the data such as which Aircraft types are more dangerous on average.
- Exploratory Data analysis- To uncover relationship

Metrics Used:

- Accident Frequency
- Aircraft Make and Model
- Fatality Rate = $\text{Total fatalities} / \text{Total Accidents}$
- Injury Rate = $\text{Total injuries} / \text{Total Accidents}$

Accident Severity by Aircraft Make

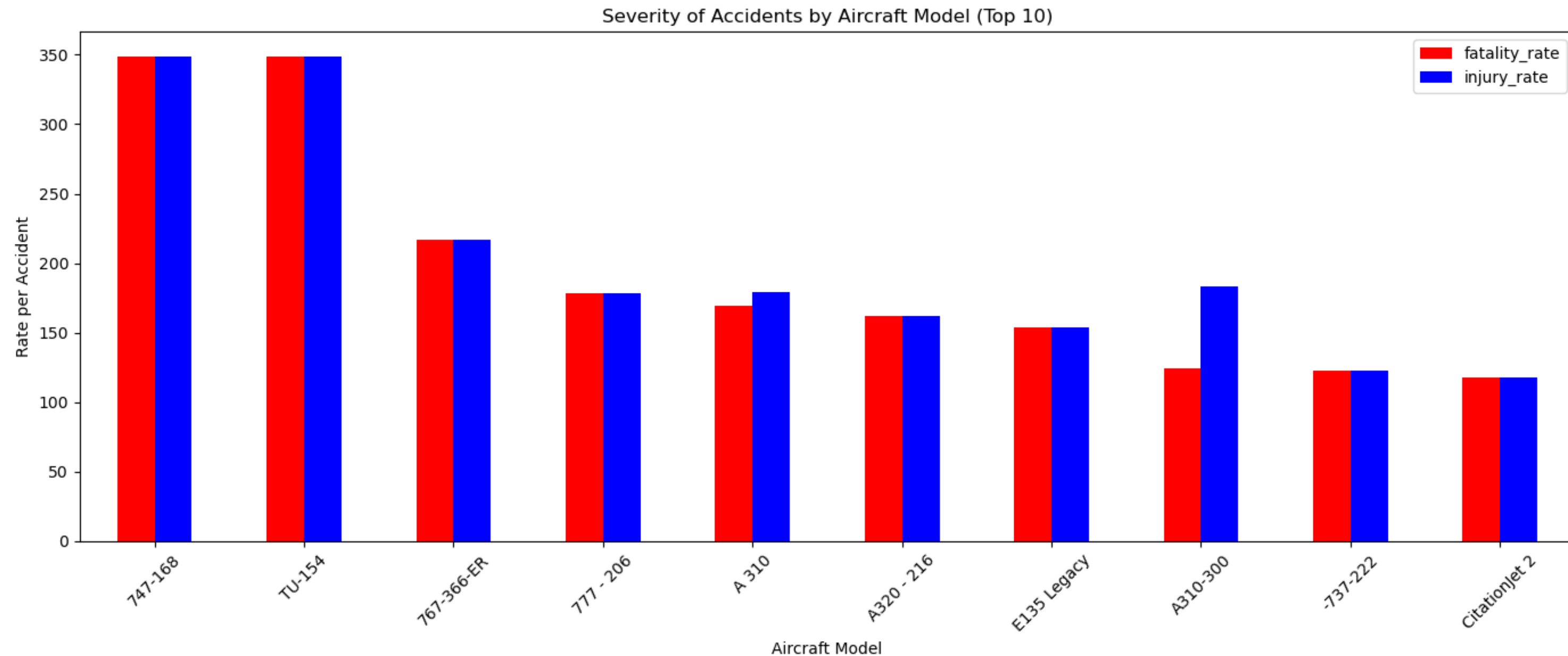


This bar chart compares the fatality and injury rates per accident across the 10 most common aircraft makes.

Key Insights for Aircraft Make Bar plot

- **TUPOLEV** has the highest number of accidents among the top 10 aircraft makes.
- It also shows a significantly elevated fatality and injury rate, indicating severe outcomes.
- **M7AERO** and **JETSTREAM** show low accident frequencies with minimal fatality/ injury impact suggesting relatively safer performance.

Accidents Severity by Aircraft Model



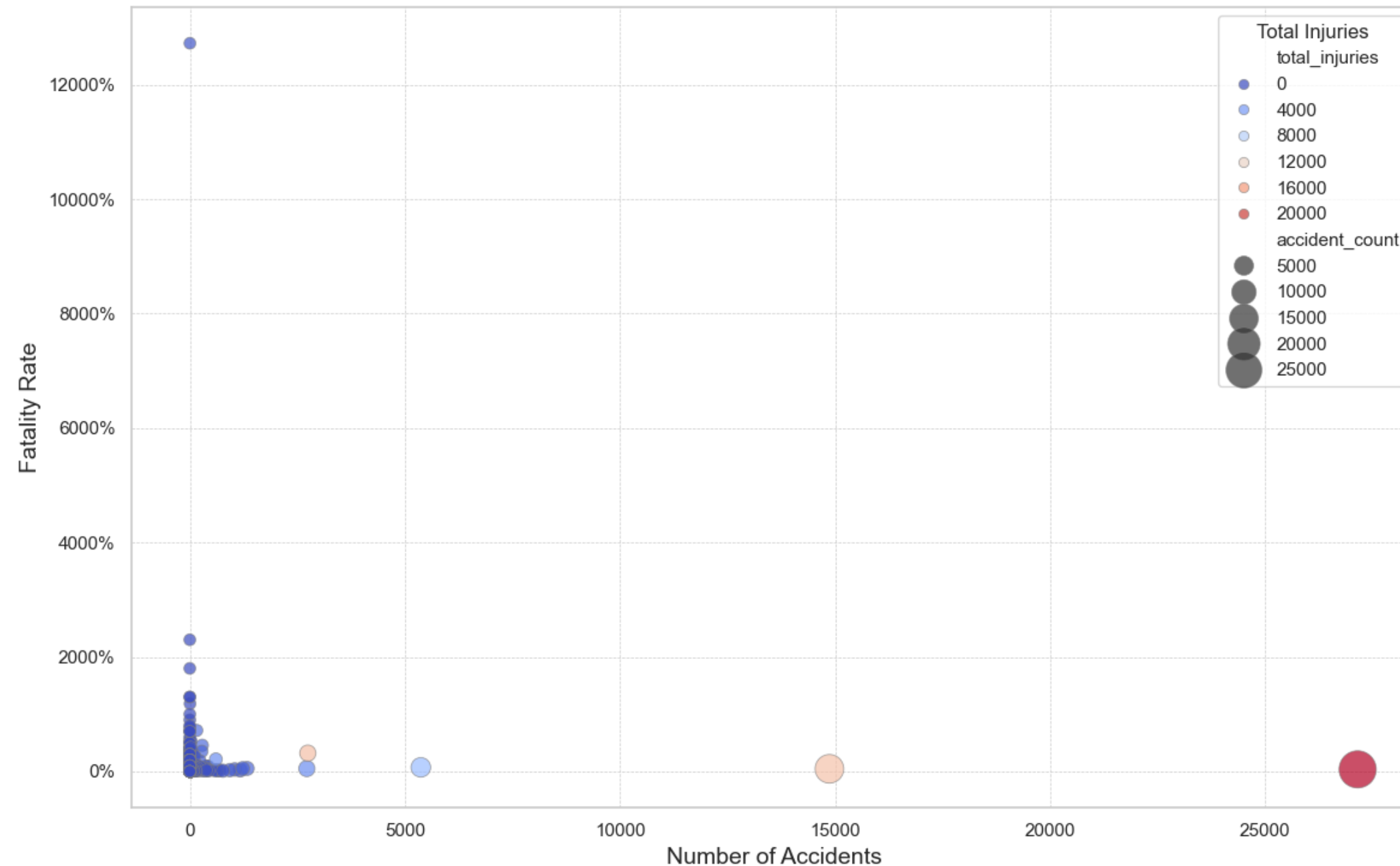
This bar chart compares the fatality and injury rates per accident across the 10 most common aircraft models.

Key Insights for Aircraft Model Bar plot

- **747 and TU-154** have the highest number of accidents both with elevated injury and fatality rates.
- In contrast, 737-222 and Citation Jet 2 shows lower accident frequencies with moderate severity.

Comparing Accident Frequency with Severity

Accident Frequency vs. Fatality Rate by Aircraft Make



This scatter plot illustrates about the number of accidents and the fatality rate per accident across different aircraft makes.

Key Insights

1. Frequent, low severity aircraft:

- Aircraft with high accident counts but low fatality rates likely represent widely used models with better overall safety performance

2. Infrequent, High-Severity Aircraft:

- Aircraft with low accident counts but high fatality rates suggest models that experience fewer accidents, but when they do, the incidents tend to be severe, indicating a higher safety risk per accident.

3. High-Risk Aircraft:

- Aircraft with both high accident count and high fatality rates may represent higher-risk models that could benefit from closer evaluation or enhanced safety measures.

Recommended Aircraft characteristics for Acquisition

- ————— Low accident frequency
- ————— Low fatality and injury rates
- ————— Aircraft to consider : **Citationjet 2, M7AERO**
- ————— Aircraft to Avoid/ Investigate Further : **TUPOLEV, TU-154**



Any Questions



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Thank YOU

