AIRCRAFT RISK PROFILING FOR INFORMED ACQUISITION

A Data-Driven Approach To Inform Fleet Selection and Safety Strategy

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Project Overview

Purpose: To help our company make informed decisions about aircraft acquisition and operational safety by analyzing historical aviation accident data.

Key Goals:

- Identify aircraft types with higher safety records.
- Understand which aircraft model and make is best for acquisition.
- Generate actionable business insights to reduce future risk.

Business Understanding

Why this matters: As the company expands into aviation, minimizing risk is crucial to protect investments, ensure passenger safety, and comply with regulations.

Business Questions:

- Which aircraft types are safest?
- What are the most common risk factors?
- How can data guide our fleet and safety planning?

Data Understanding

Data Source: National Transportation Safety Board accident dataset

Data Overview:

- 80,000+ aviation accidents from 1962 to 2023
- Fields include: aircraft type, location, accident cause, number of fatalities/injuries, flight purpose.

Preprocessing Steps:

- Load and read the dataset from NTSB that includes aviation accident data from 1962 to 2023.
- Preview the first few rows of the dataset to understand its structure and contents.
- Clean missing entries
- Categorize aircraft models and causes for consistency

Tools

Data Analysis Techniques

Why these tools?

Tools used:

- Python: Programming language for data analysis.
- Pandas: Helps clean and organize data.
- Matplotlib & Seaborn: Create charts and graphs for trends.

Why use these tools?

- They allow us to uncover trends and patterns from thousands of records quickly and accurately.
- They enable us to visualize data that was in raw form.
- They depict business insights for effective decision making.

Bar Chart

Data Visualization

Insight:

- Some aircraft models are involved in significantly more accidents per 1,000 flights than others.
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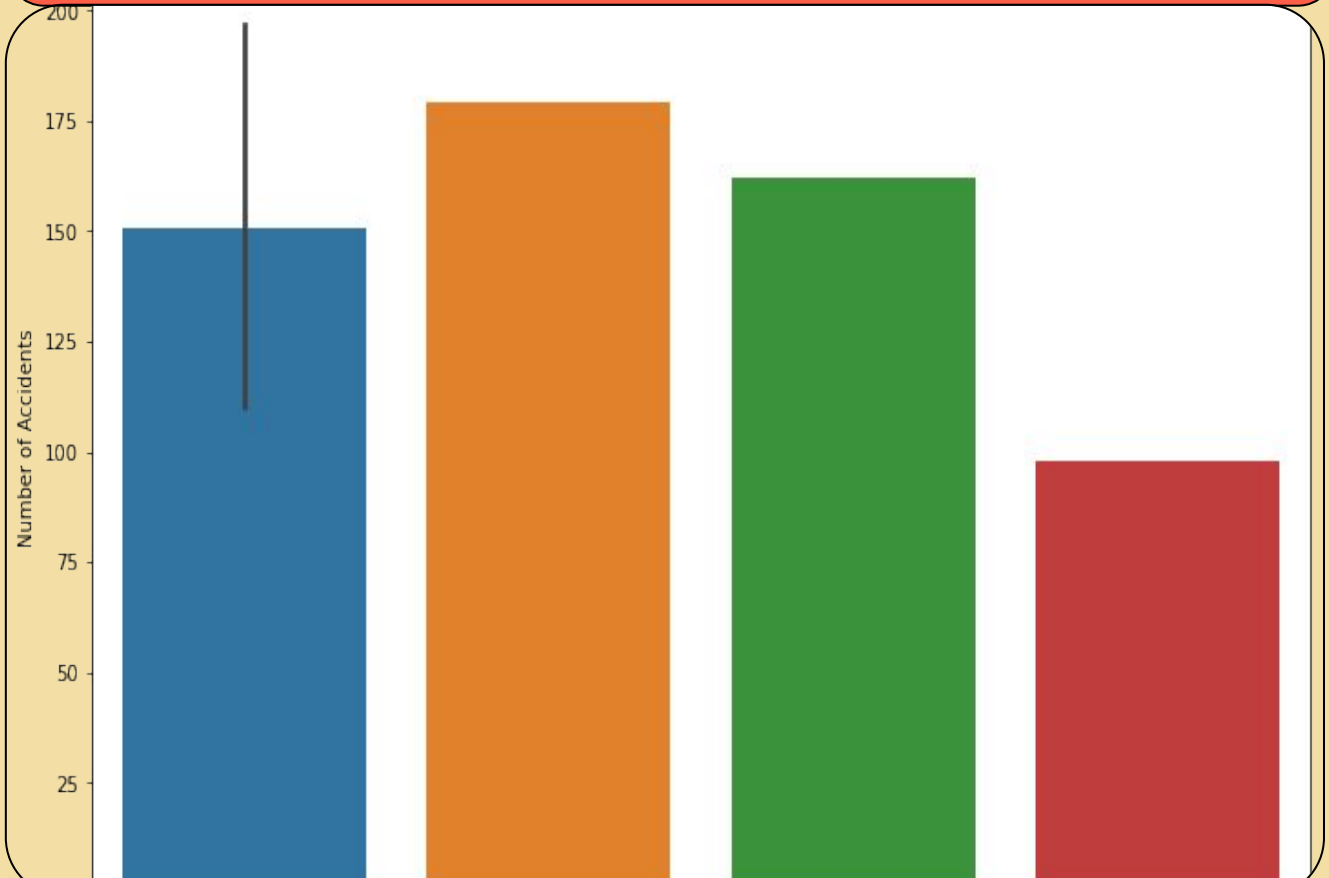
- Blue being CESSNA, Orange being Boeing, Green being Cessna, and Red being Cirrus Design Corp

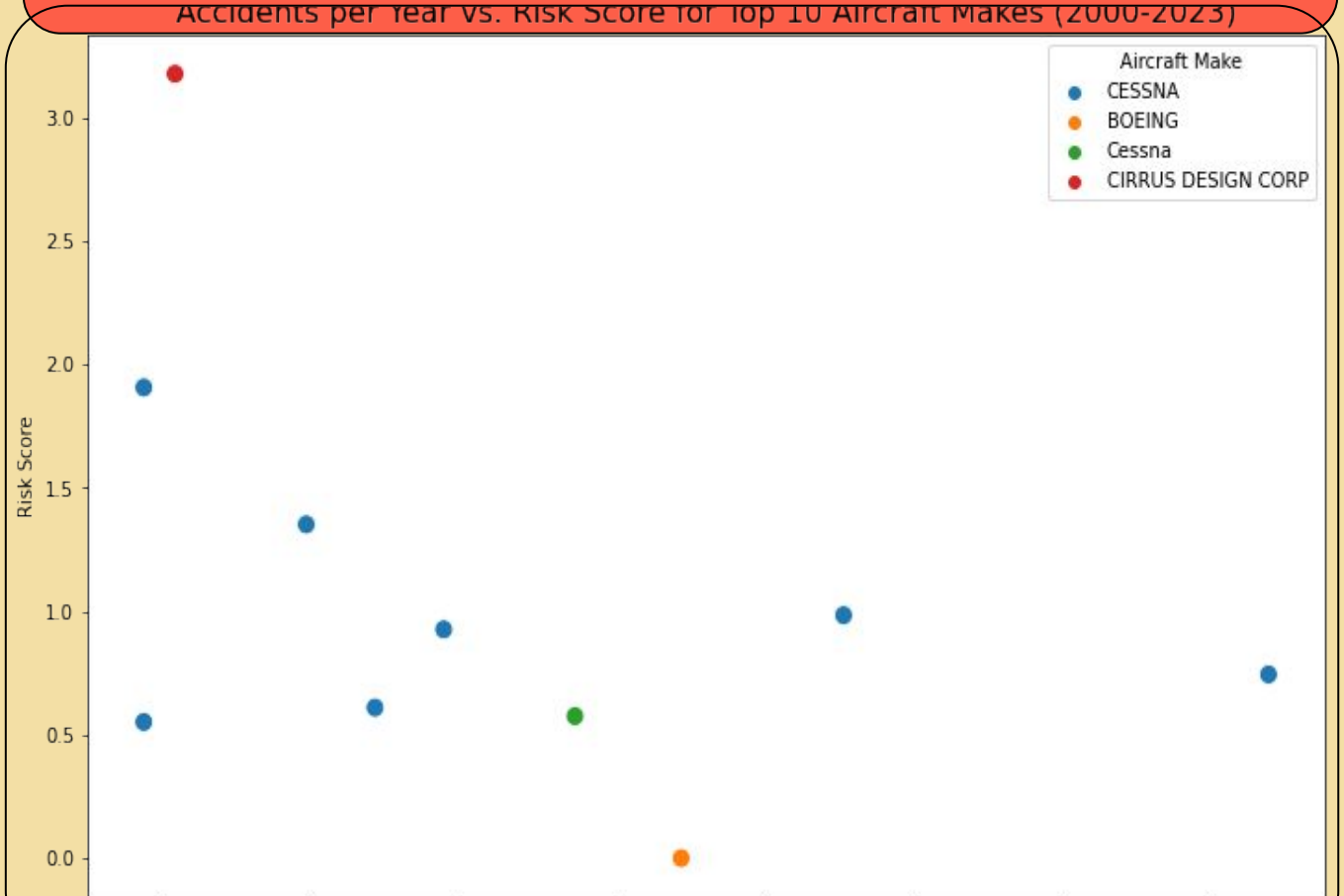


Visualization

Scatter Plot

Insight:

- Aircraft makes with higher accident frequency tend to also have higher risk scores, indicating a strong correlation between how often accidents occur and the overall severity.

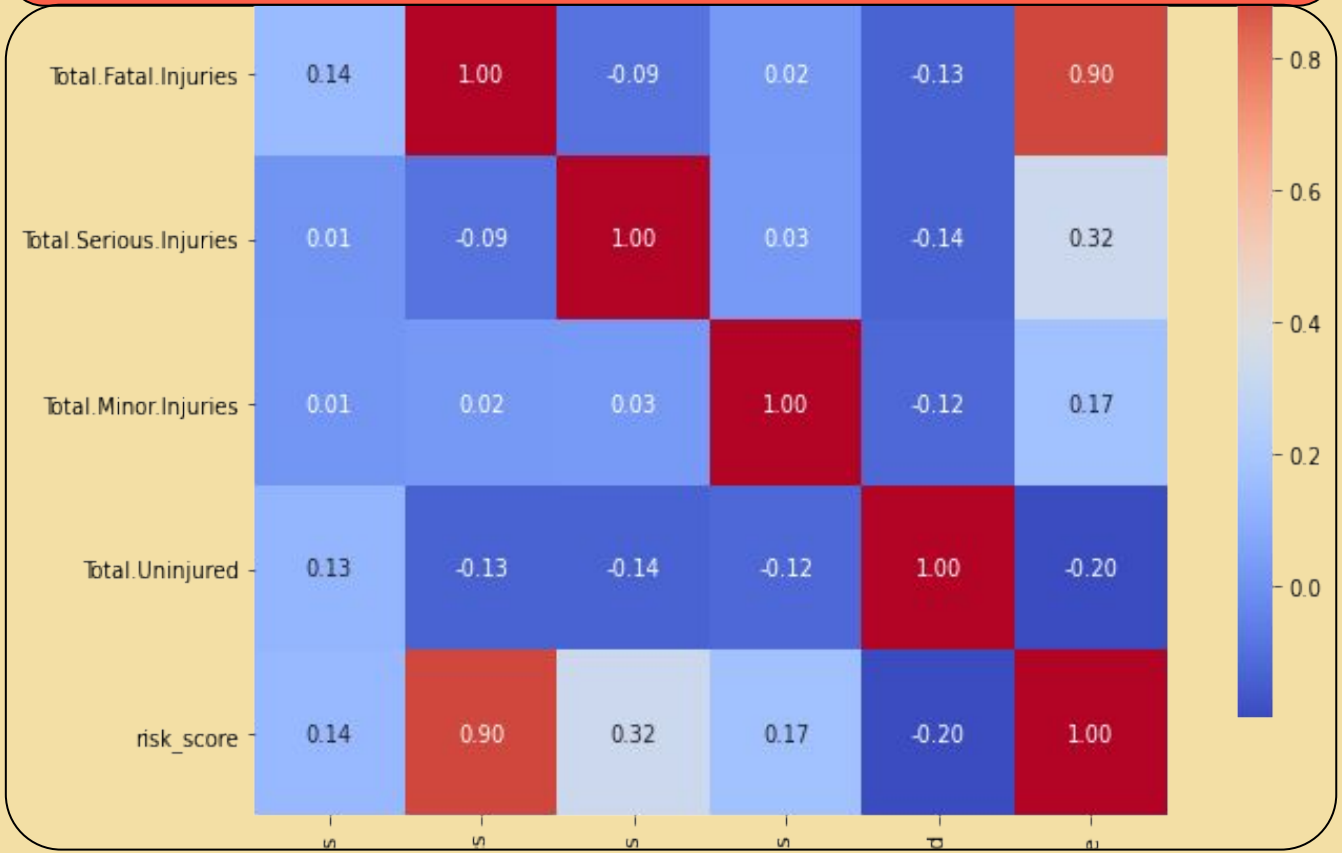


Heatmap

Visualization

Insight:

- Accidents per year is strongly correlated with both total accidents and fatalities, suggesting that aircraft with frequent incidents are also more likely to have severe outcomes.



Recommendations

1. Prioritize aircraft with lower historical accident rates when selecting fleet models.
2. Implement stricter safety checks and oversight for non-commercial operations.
3. Improve safety training and maintenance to reduce top accident causes.
4. Focus on operations during the safest weather conditions.
5. Focus on improving safety in the most accident-prone locations.

THANK YOU

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