Analysis of Aviation Accidents

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Summary

Descriptive analysis of aviation accidents data (1962–2023) reveals three ways to identify the safest and lowest-risk airplanes:

- **By engine type** – Reciprocating and Turbo Fan engines show the lowest fatality rates.
- **By survival rate** – Boeing and Hughes aircraft consistently achieved the highest survival outcomes.
- **By aircraft resilience** – Boeing models were least likely to be destroyed in accidents.

Outline

- Business Problem
- Data
- Methods
- Results
- Conclusions

Business Problem

Problem: The Company is expanding into the aviation industry in order to diversify its portfolio.

Challenge: Since this is a new market, It needs to identify the lowest-risk aircraft for commercial & private use

Goal: To maximize passenger safety and minimize financial loss

Data

Coverage: ***Civil aviation accidents & selected incidents (1962–2023)*** in the U.S. and international waters

Source: **National Transport and Safety Board** (N.T.S.B)

Size: ***31 columns*** by ***90348 rows*** including date, year, location, aircraft make/model, fatalities, etc.

Scope: Not limited to airplanes — includes aerial vehicles such as hot air balloons, gliders, and rockets

Methods

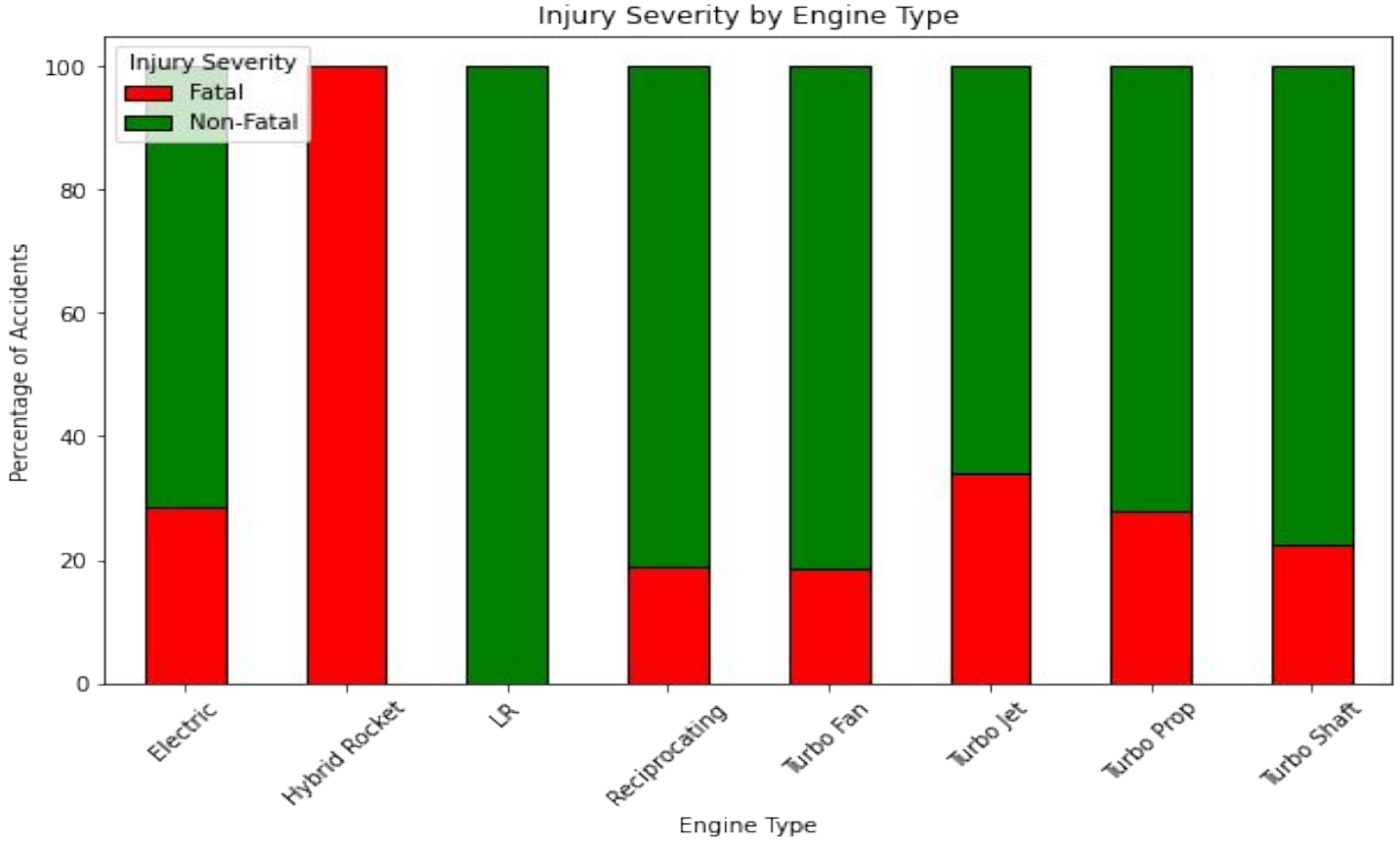
Data Cleaning

- Removed 15 irrelevant columns
- Added: *Survivors, Total Passengers, Survival Rate*
- Filled key nulls; dropped rows missing *Engine Type* / *Aircraft Damage*
- Standardized redundant values (*Make*, *Injury Severity*)

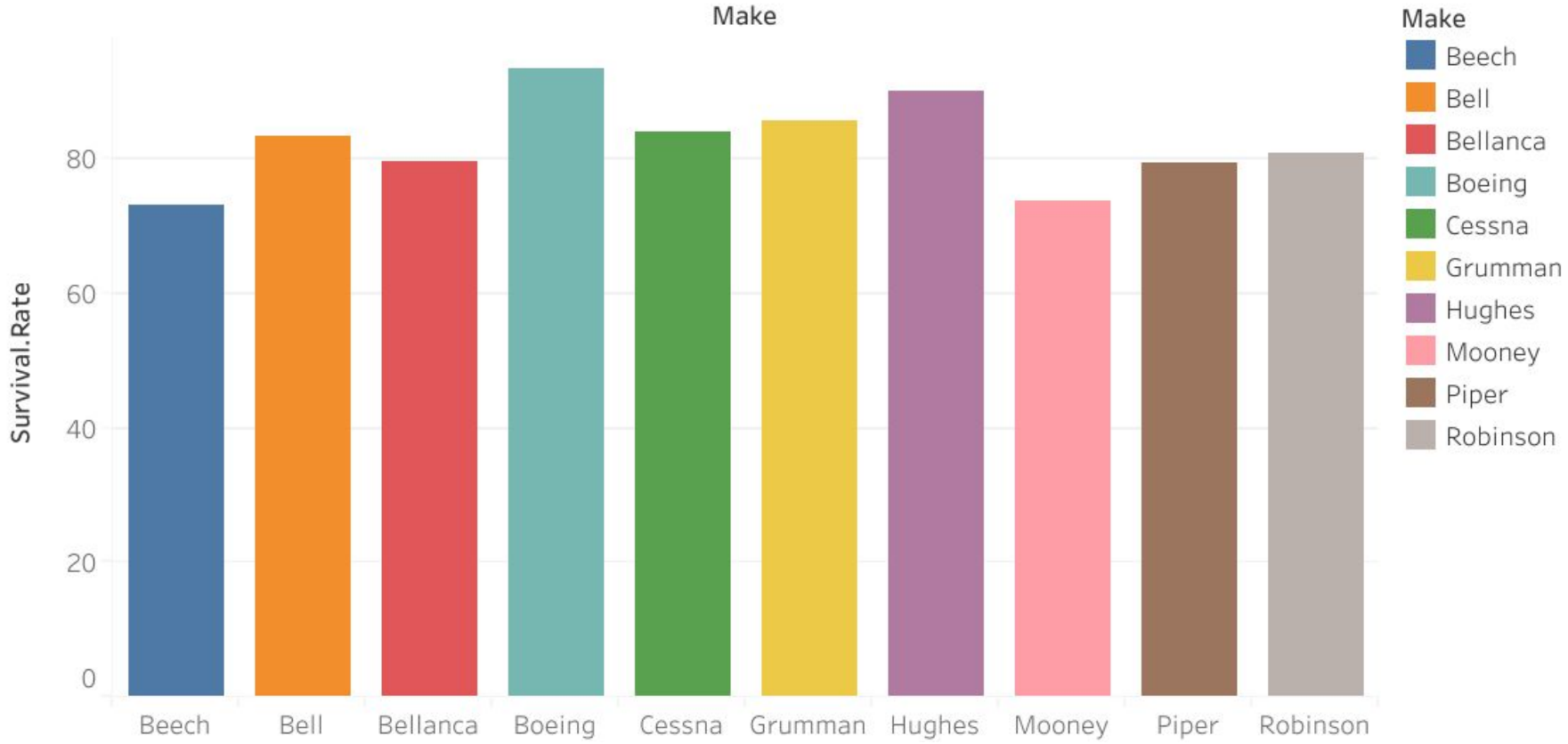
Data Visualization

- **Engine Type & Safety**
- **Survival Rates by Aircraft**
- **Structural Resilience (Damage vs. Destruction)**

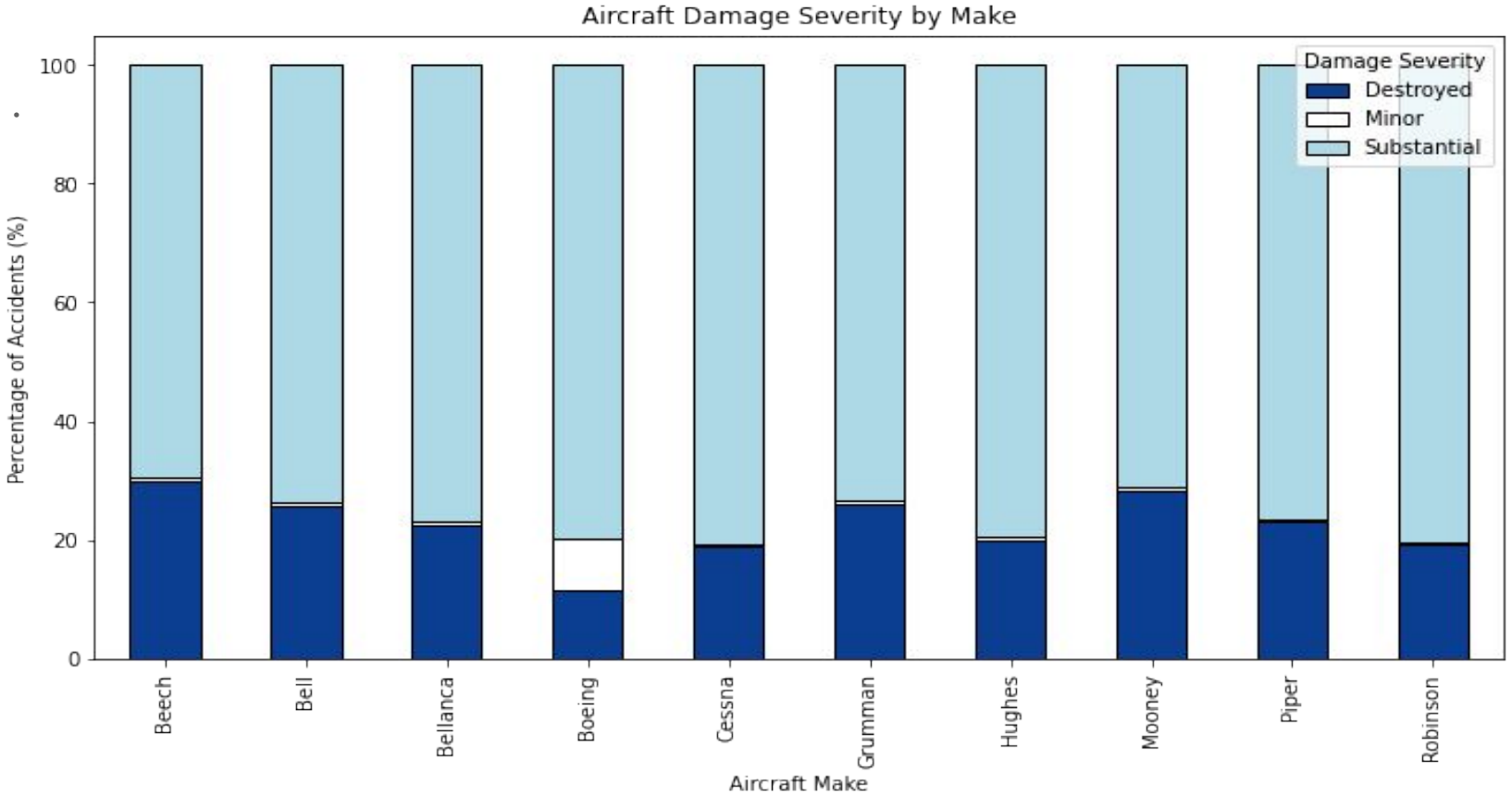
Engine Type and Safety



Average Survival Rate of Top 10 most popular aircraft makes



Structural Resilience



Conclusions

Recommendation 1 -Prioritize **Reciprocating** or **Turbo Fan Engines**

Lowest fatality rates (~18% fatal vs. 80% non-fatal)

Recommendation 2 -Among top 10 makes, survival rates are high overall

Boeing (94%) and **Hughes (93%)** stand out

Recommendation 3 -Boeing shows greatest structural resilience

Lowest proportion of destroyed aircraft (11%)

Project Limitations

- Focused only on **top 10 most popular aircrafts**
- Avoided skew from **6,932 total makes**, especially small 2–3 passenger planes
- Insights best apply to **large, commercial-use aircrafts**
- Future work: evaluate **smaller/private aircrafts** separately

Thank You!

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