New Aviation Low Risk Aircraft Purchase Project

Identify Low Risk Aircraft for Commercial and Private Enterprise

Aviation Safety and Risk Analysis

2025

This project focuses on reducing operational and safety risk when purchasing aircraft by learning from decades of aviation accident history.

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New Aviation Division: Leveraging Aviation Accident Analysis for a Safe and Successful Purchase and Operations of Commercial and Private Air Fleet.

- ✓Purchasing Aircrafts involves high starting capital and safety risk
- ✓Poor uninformed aircraft choices may lead to:
  - Financial loss
  - Non-compliance with prevailing national laws for aircraft registration and operation
  - Reputational loss
  - Difficulty in financing and insurance
  - Unexpected operating costs.
- ✓The New Aviation Division require evidence based guidance not assumptions., to be able to minimize risk when purchasing new aircrafts.

Project Objectives

- Identify aircrafts models with :
  - Low accident frequency
  - Low injury severity
  - Consistent operational safety in different types of flights
- Support low risk purchase of aircrafts
- Provide interactive dashboards for case study analysis

I focus on patterns over time rather than isolated incidents.

AviationData_csv

Contents of the AviationData used:

- Civil aviation accident records
- Between 1962-2023 and 1948
- Coverage:
  - U.S.A AND International waters
  - Commercial and private aircraft
- Each record represents one reported aviation accident

This dataset allows me to evaluate long term safety trends across aircraft models.

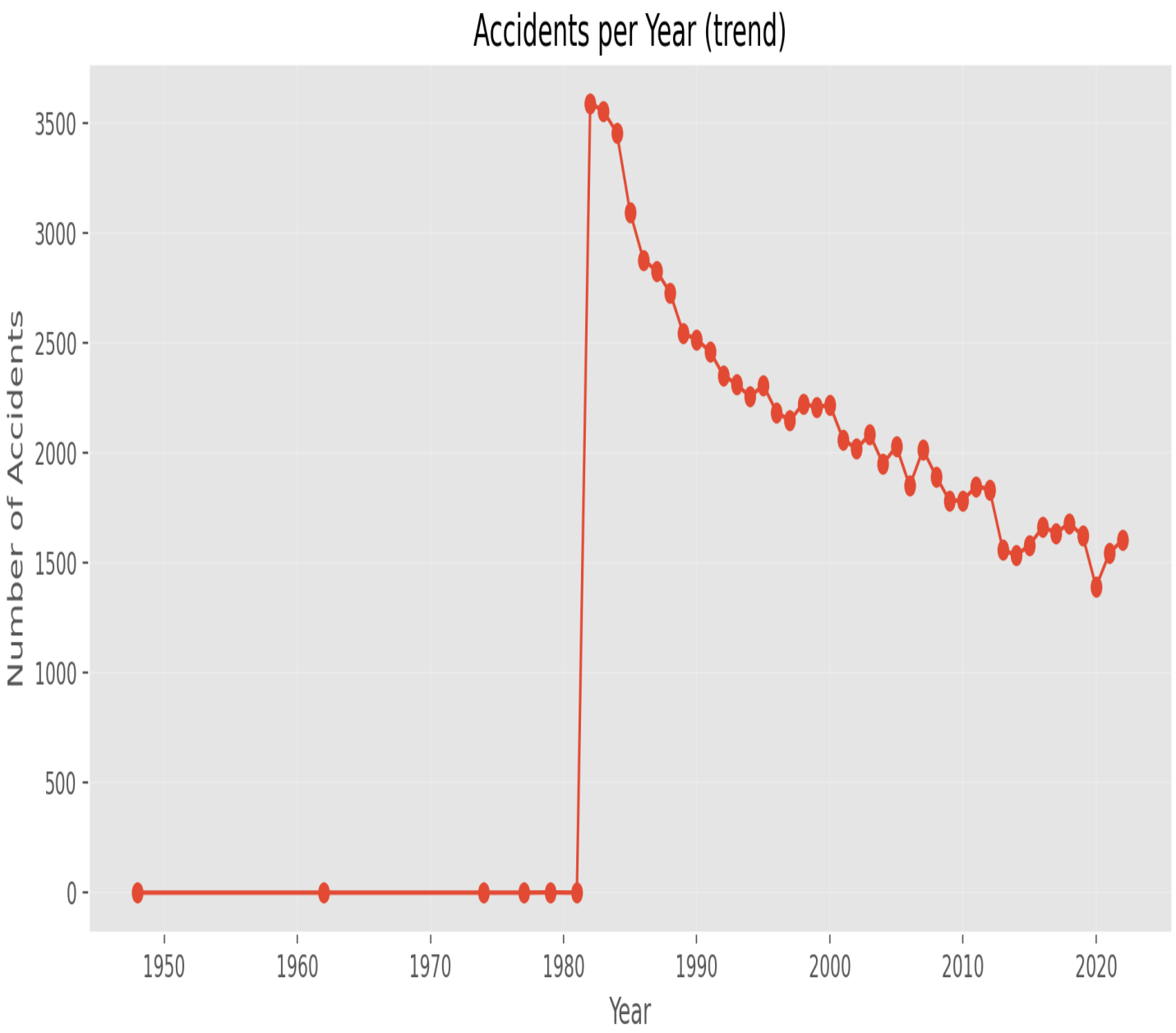
Data Manipulation(preparation)

How the data was prepared:

- **Remove incomplete or irrelevant fields**
- **Standardized column names**
- **Converted date for trend analysis**
- **Created safety indicators:**
  - **Accident frequency per year**
  - **Fatality rate**
  - **Severity rate**

The safety indicators ensures results are reliable and comparable across aircraft models.

Accidents Trends Over Time

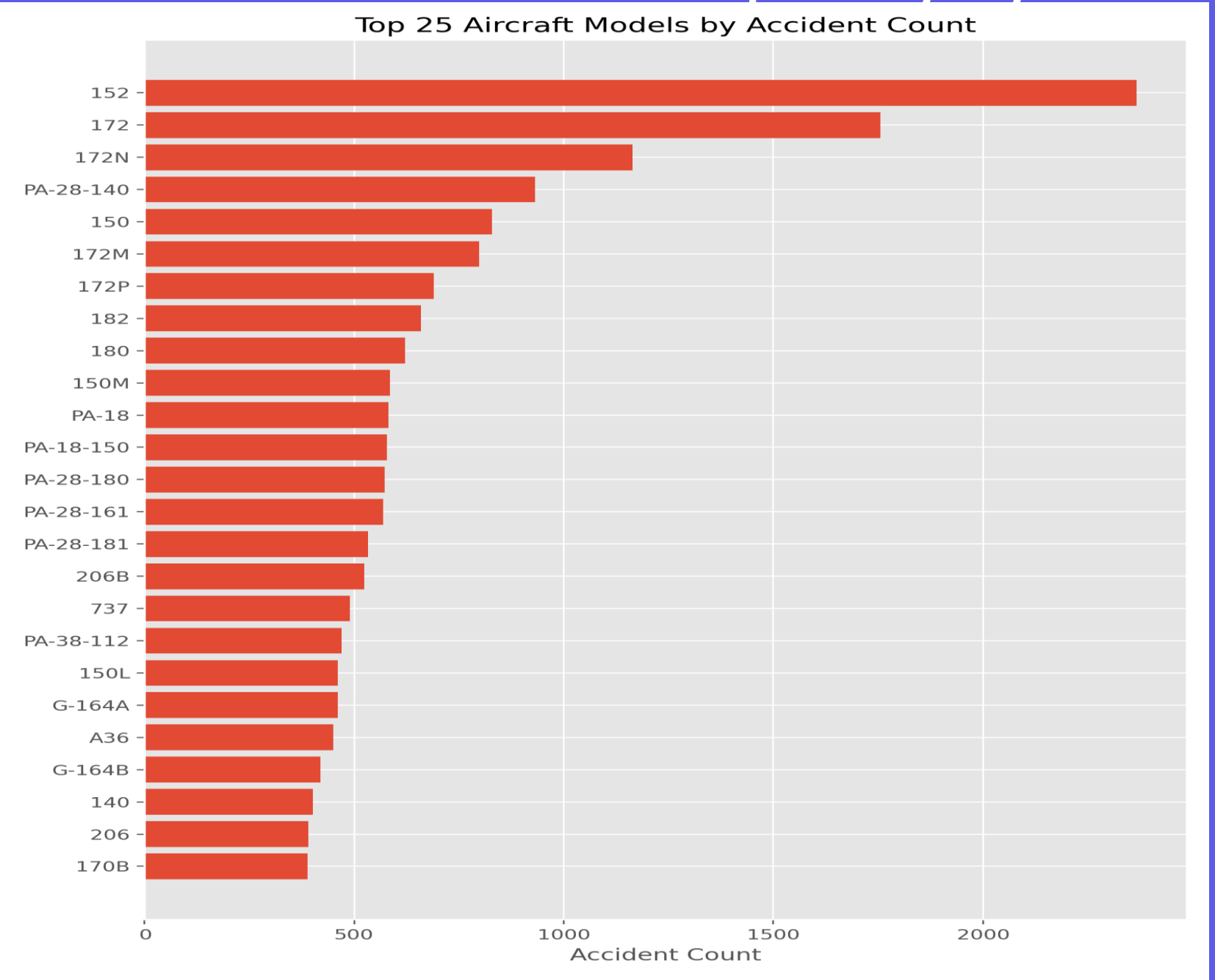


Key Observations: Accident Trends

- Accident reporting increased significantly after 1980
- Overall trends shows:
  - Improved safety standards
  - Better reporting practices
- Modern aviation operates under strictier safety controls

Here I have interpreted the historical risk

Accident Frequency by Aircraft Model

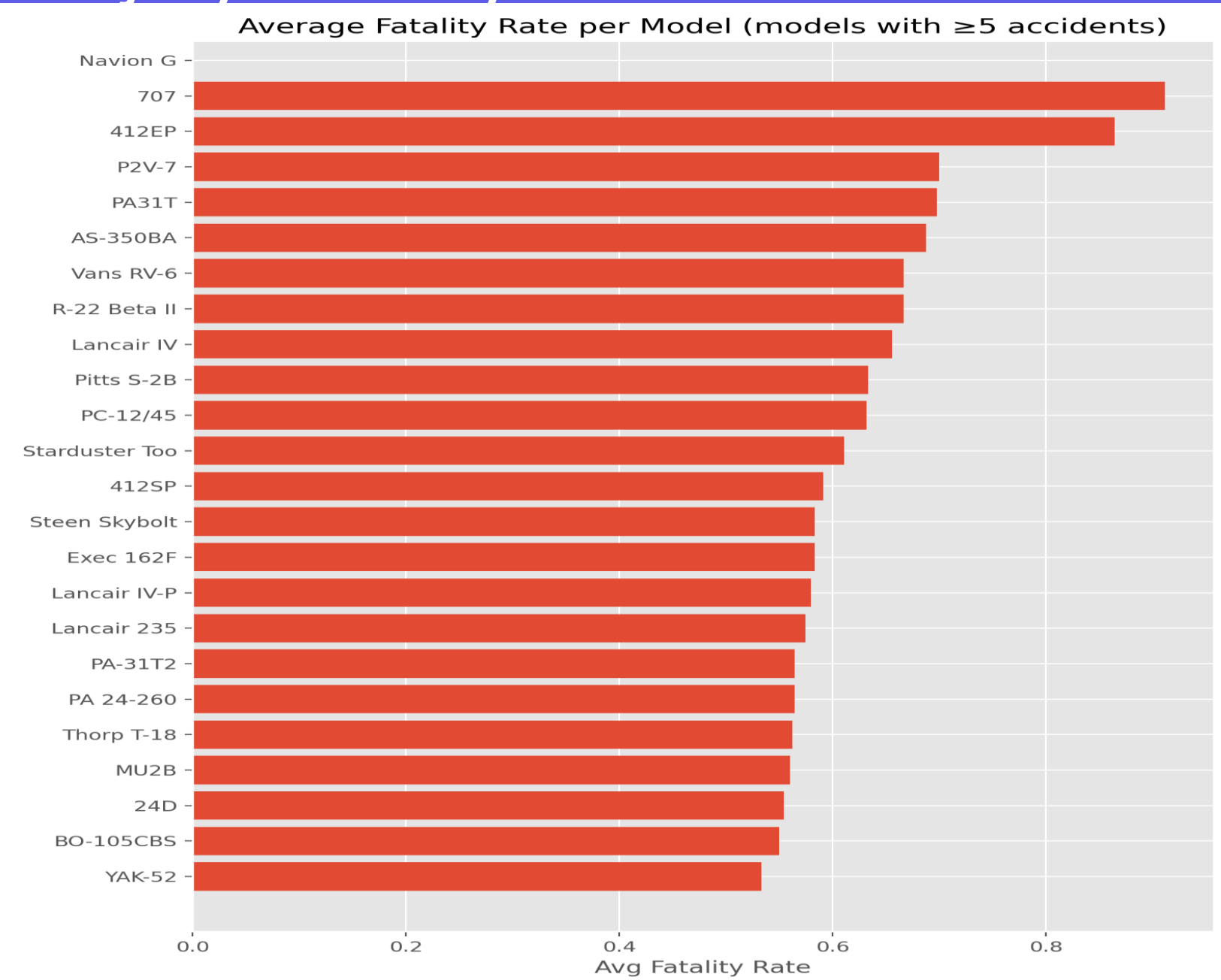


What I Observed:

- Some aircraft models appear more frequently in
- Higher frequency often reflects:
  - Greater usage
  - Longer operational history
- High frequency alone does not imply high risk

The fact that some aircrafts are used more often than other models makes it important to analyse severity of accidents to make informed decision on the risk.

Injury Severity Matters More than Frequency of Accidents

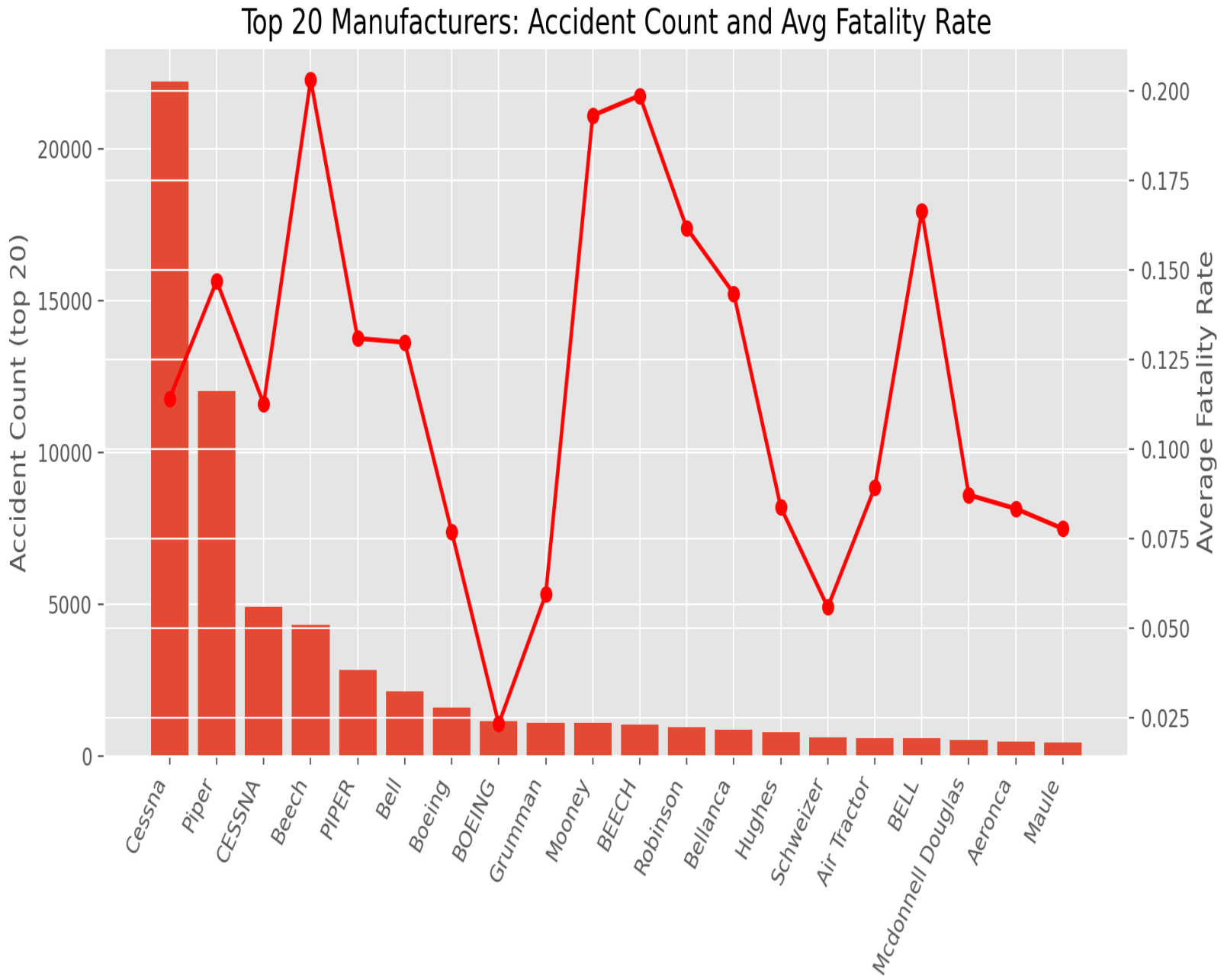


Why Severity was prioritized

- Not all accident result in serious harm
- I evaluated:
  - Fatal injuries
  - Serious injuries
  - Minor injuries
- Developed a severity score to compare impact

Low risk aircrafts are those with lower injury outcomes when the accidents occured

Low Risk Aircrafts Models



Low Risk Aircraft Models Identified

- Selected models show:
  - Multiple recorded accidents
  - Zero to Near zero fatalities
  - Consistently low severity scores
- These models demonstrate strong safety performance

The displayed models show safer investment options based on historical evidence.

Interactive Dashboard for the New Aviation Division

To support deeper exploration of the findiings, an interactive dashboard has been developed in Tableau.

This dashboard will allow the New Aviation Division to:

- Explore accidents trend over time
- Compare aircraft models by risk and severity
- Filter results by aircraft type and operational factors

Access the live dashboard here:

https://public.tableau.com/app/profile/brian.chairo/viz/New-Aviation-LowRisk-AircraftPurchase-Project-InteractiveDashboard/LowRiskAircraftDashboard

What this means to the New Aviation Division

- Data supports:
  - Reduced operational risk
  - Better capital allocation
  - Informed aircraft acquisition
- Transforms purchasing decisions from intuition to insight

This approach aligns safely with financial sustainability.

Limitations & Considerations

Important Considerations

- **Accident data does not include:**
  - **Total flight hours per model**
  - **Maintainance records**
- **Result should compliment**
  - **Manufacturers guidance**
  - **Regulatory assesments**
  - **Operational requirements**

This analysis informs decisions it however does not replace due diligence

Recommendations

Strategic:

- Prioritize aircraft with:
  - Low injury severity
  - Stable historical performance
- Use dashboard during:
  - Purchase planning
  - Risk assessment reviews
- Update analysis as new data becomes available

This framework is subject to evolve alongside the New Aviation Division

Conclusion

Final Takeaway

- **Historical safety data provides powerful insights**
- **Low risk aircraft can be identified objectively**
- **Data driven purchases reduces uncertainity and risk**

This risk analysis demonstrates how analytics can directly support strategic investment decisions.