

Aviation Safety Analysis: Identifying Low-Risk Aircraft for Business Expansion

Data-Driven Insights for Strategic Aircraft Purchasing Decisions

Name: Bernice Kigochi

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overview

- ▶ This project analyzes Aviation Accident Data from the National Transport Safety Board(NTSB) to provide actionable insights for a company expanding into the aviation industry. By examining historical accident data from 1962-2023. We identify the lowest-risk aircraft for commercial and private operations to inform strategic purchasing decisions.



Data Overview

- ▶ Data Source: National Transportation Safety Board (NTSB) aviation accident data.
- ▶ Time period: 1962-2023
- ▶ Key Variables:
 - ▶ . Aircraft make/model
 - ▶ . Accident circumstances.
 - ▶ . Injury Severity.
 - ▶ . Weather Conditions
 - ▶ . Phase of Flight.

Methodology

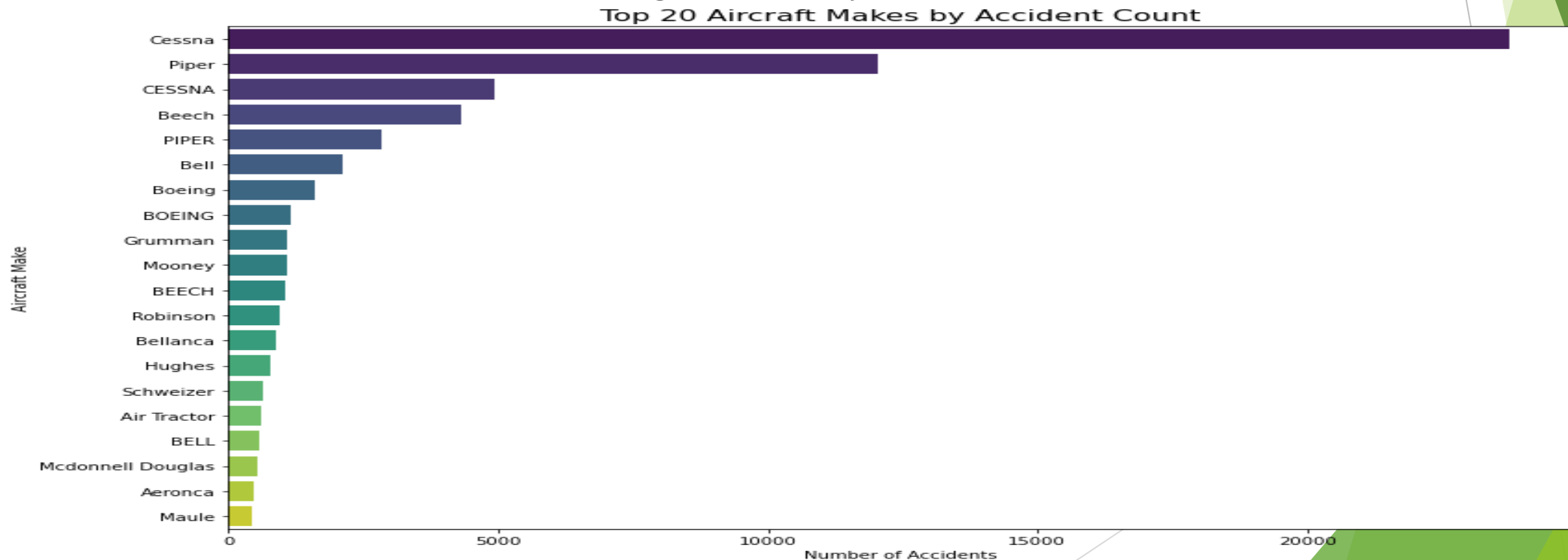
- ▶ Key Goals
- ▶ . Data Understanding, Preparation and Cleaning.
- ▶ . Exploratory Data Analysis
- ▶ . Visualizations for each analysis
- ▶ . Business Recommendations

Data cleaning process

- ▶ Challenges:
 - ▶ . Missing values(latitude/ longitude, weather conditions)
 - ▶ .Mixed data types.
 - ▶ . Inconsistent Formatting.
- ▶ Solutions:
 - ▶ . Median Imputation for numerical data.
 - ▶ . Mode imputation for categorical data.
 - ▶ . Type conversion for dates

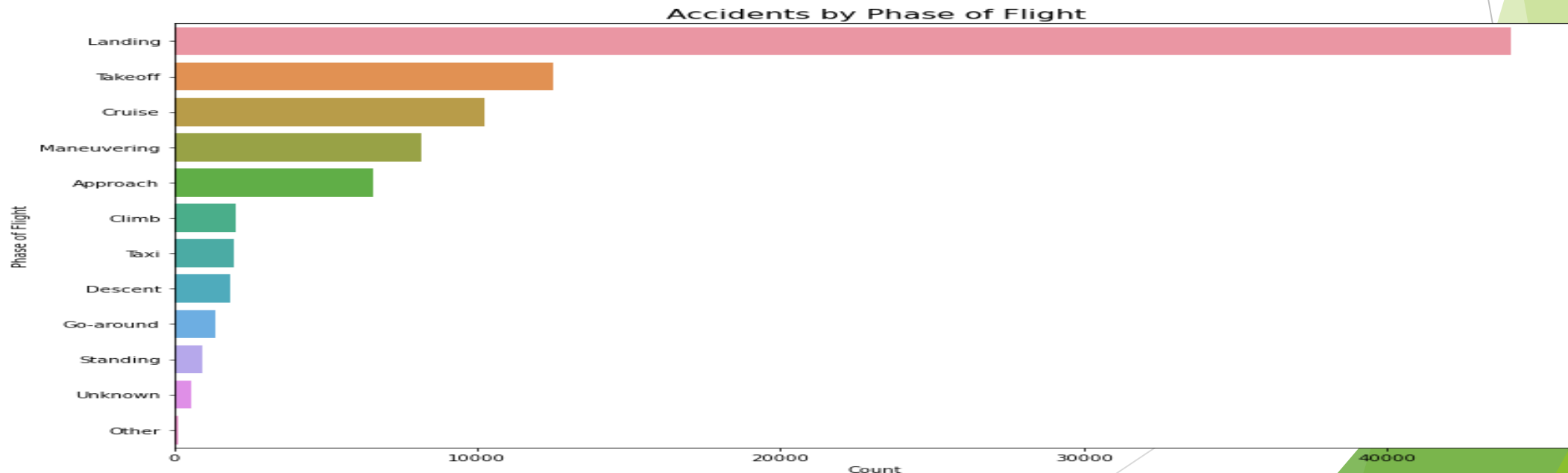
Key Findings- Aircraft Safety

- ▶ Top Findings :
- ▶ . Cessna and Piper have highest accident counts (due to prevalence)
- ▶ .Some less common aircraft show highest fatality rates.



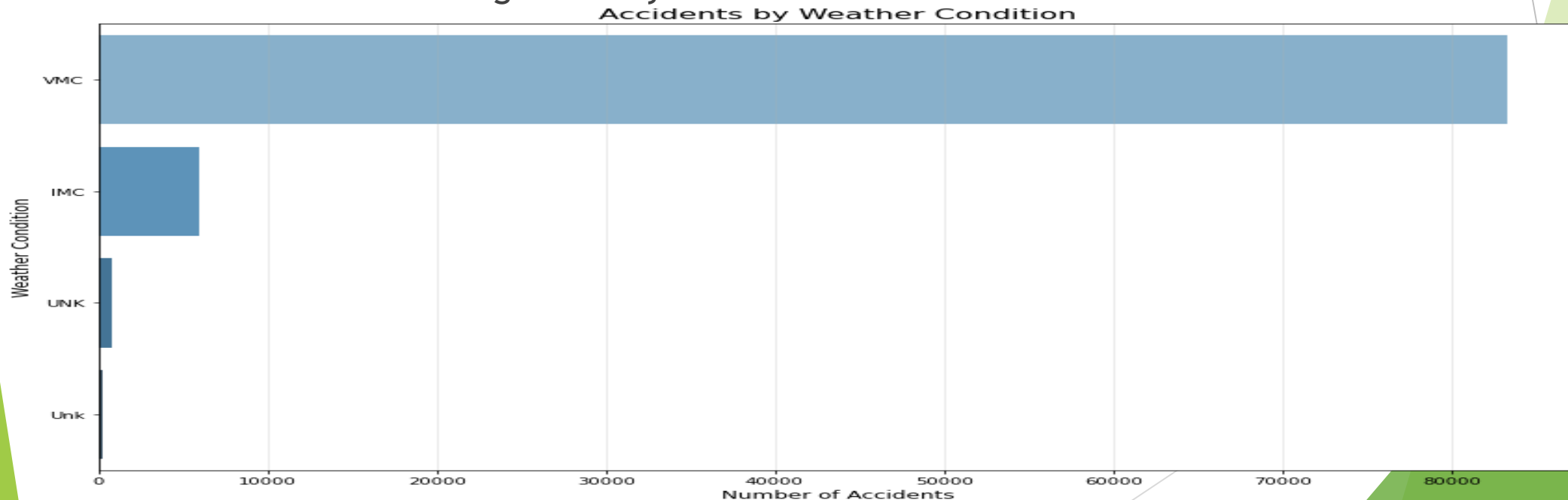
Phase of Flight Analysis

- ▶ Critical Findings:
- ▶ . Cruise phase appears most dangerous in terms of fatality rate.
- ▶ . Takeoff/landing have high accident counts but lower fatalities.
- ▶ . Approach and maneuvering also high-risk phases



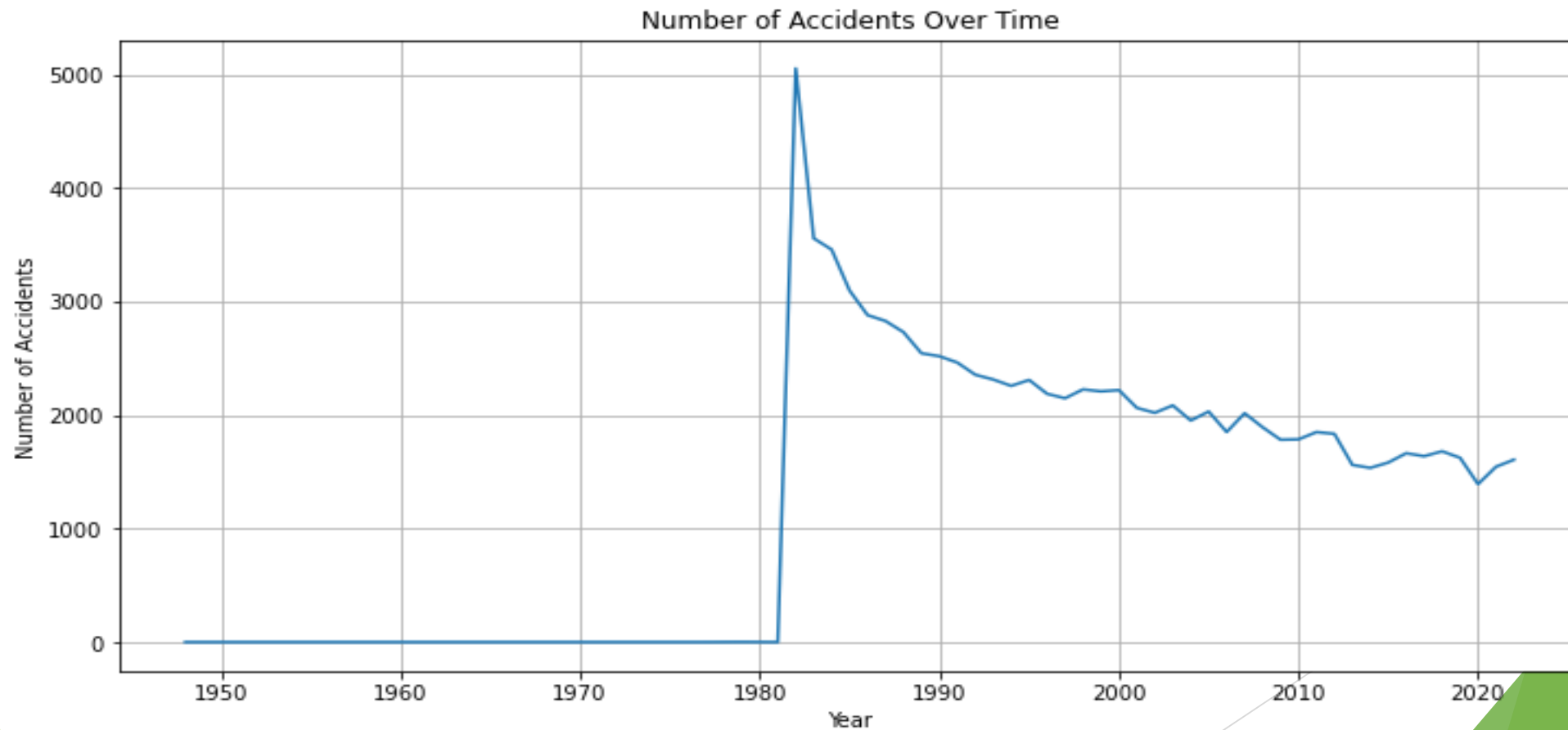
Weather Impact Analysis

- ▶ Key Insights:
- ▶ . IMC show significantly higher fatality rates than VMC.
- ▶ . Unknown weather conditions have lowest fatality rates.
- ▶ . VMC conditions are significantly safer.



Temporal Trends

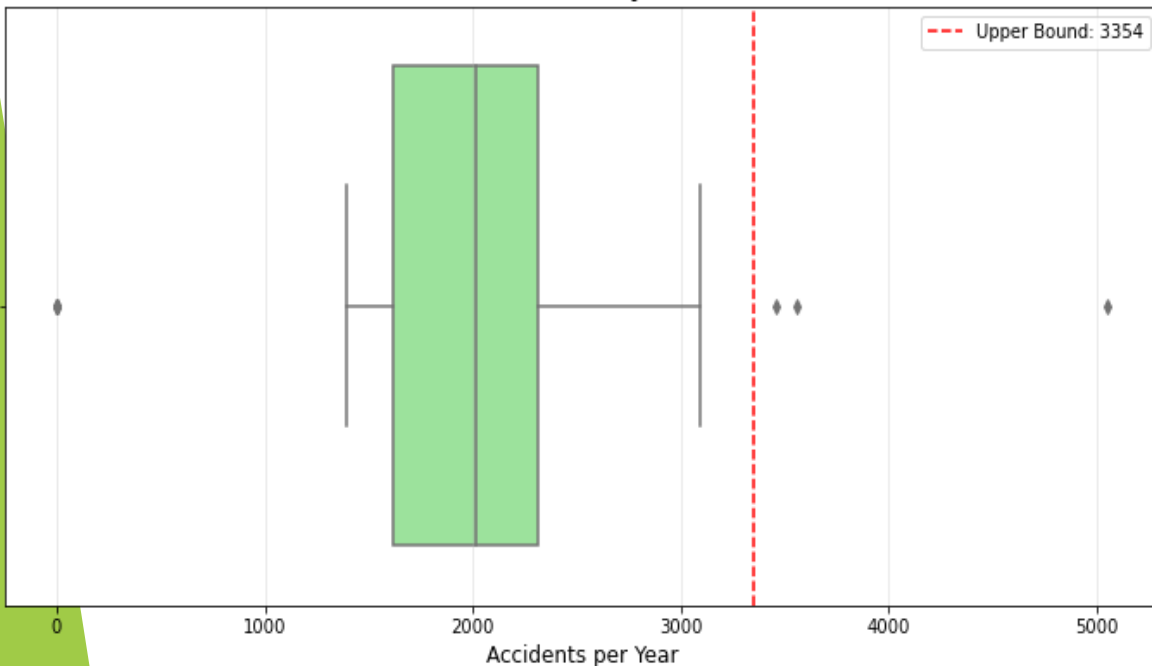
- Line graph showing accidents by year



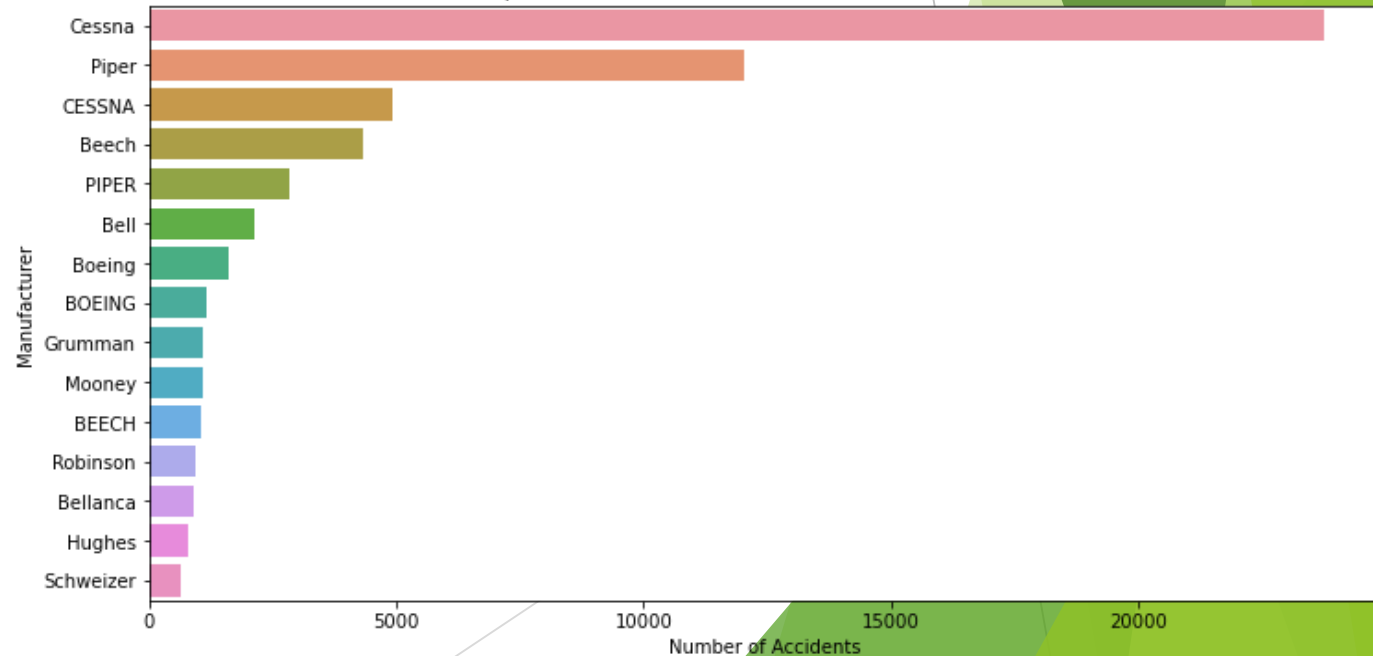
Key Visualizations

- ▶ Impactful visualizations
- ▶ . Box plot of injury counts (showing outliers)
- ▶ . Safety ranking of top aircraft models.

Outlier Detection in Yearly Accident Counts



Top 15 Aircraft Manufacturers Involved in Accidents



Business Recommendations

- ▶ Aircraft Selection:
 - ▶ . Prioritize models from safest manufacturers.
 - ▶ . Consider operational history and accident rates.
- ▶ Weather Avoidance:
 - ▶ .Prioritize flights in VMC conditions when possible.
- ▶ Phase of Flight Training:
 - ▶ . Focus on cruise phase operations where fatality rates are highest.
- ▶ Maintenance Protocols:
 - ▶ . Pay special attention to high-risk components.

Conclusion

- ▶ Summary of key Takeaways
- ▶ Business Impact:
 - ▶ .Informed purchasing decisions.
 - ▶ . Targeted Safety Improvements.
 - ▶ . Risk Mitigation Strategies.



Q and A

- ▶ THANKYOU
- ▶ EMAIL ADDRESS: bernicewakarindi@gmail.com
- ▶ Open forum for questions.



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