

Wings of Opportunity

A Data-Driven
Approach to
Informed Aircraft
Acquisition

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Understanding Aircraft Accident Data

01 - Overview

02 - Business Understanding

03 - Data Understanding

04 - Data Analysis

05 - Recommendations

06 - Next Steps

07 - Thank You

O1 – Overview

*Analyzing data enables
informed decision-making*

As part of our strategic expansion into the aviation sector, this project aims to identify optimal aircraft for commercial and private operations while minimizing risk. We will conduct a comprehensive risk analysis of various aircraft models, utilizing a data-driven approach to evaluate key factors such as:

- Accident Trends Over The Years
- Environmental Factors
- Aircraft Specification

The final deliverable will consist of actionable insights to guide purchasing decisions for our aviation division.

Business Understanding

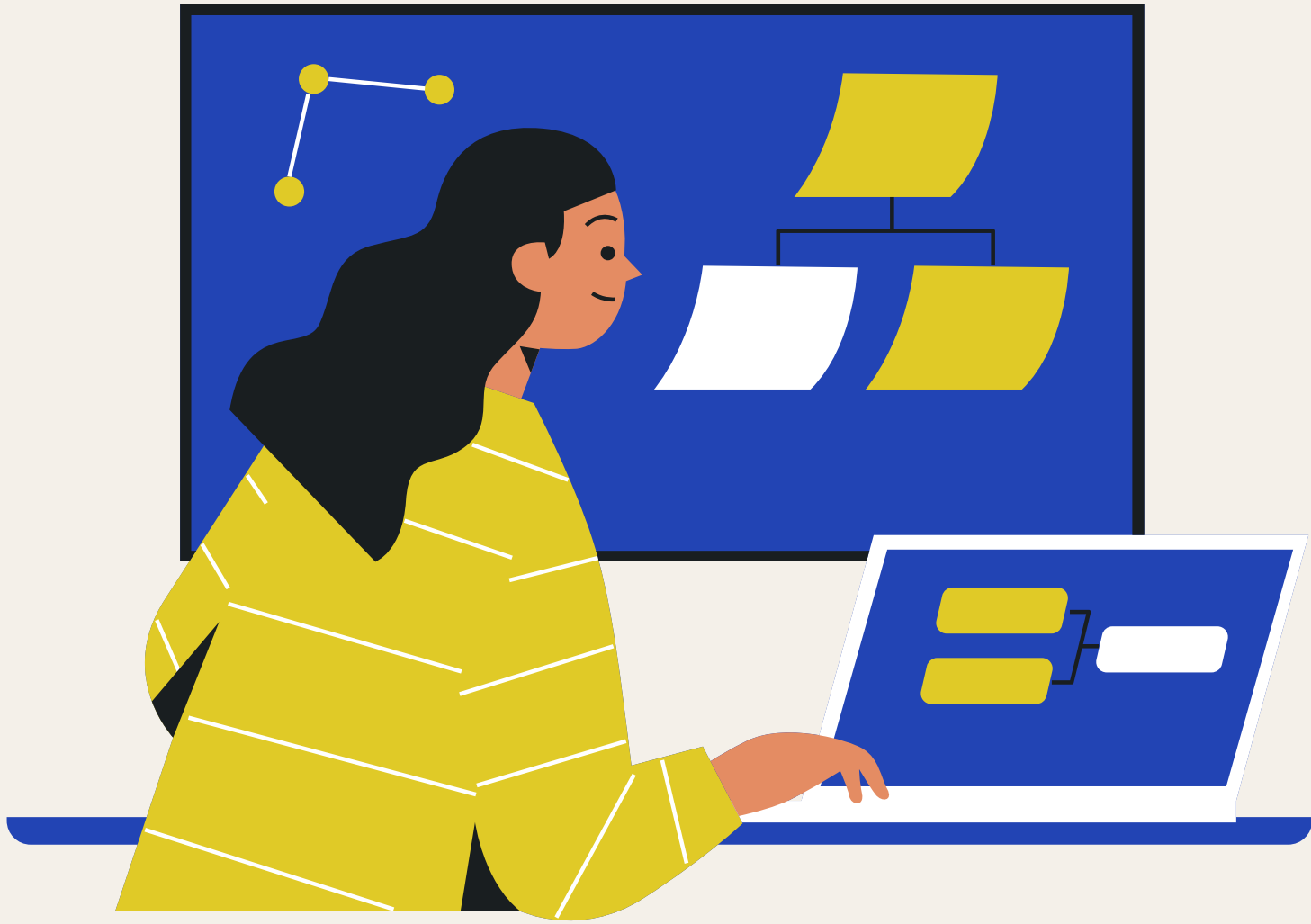
The company is expanding into the aviation sector and needs to identify aircraft models for commercial and private operations. The challenge lies in selecting aircraft that minimize financial and operational risks. A comprehensive risk analysis is required, focusing on accident data, geographical factors, and operational costs, to ensure an optimal balance between cost, safety, efficiency, and profitability.

Objectives:

- Identify aircraft models with the lowest accident rates using NTSB data (1962–2023).
- Evaluate how environmental factors affect aircraft safety and performance.
- Determine which aircraft models provide the best trade-off between safety, cost, and long-term profitability.



Success Criteria



- **Accurate Risk Analysis:** Identify aircraft models with the lowest accident rates and best safety records.
- **Data-Driven Recommendations:** Provide clear recommendations to minimize financial and operational risks.
- **Actionable Insights:** Deliver a comprehensive report to support evidence-based decision-making for aircraft purchases.

Assumptions

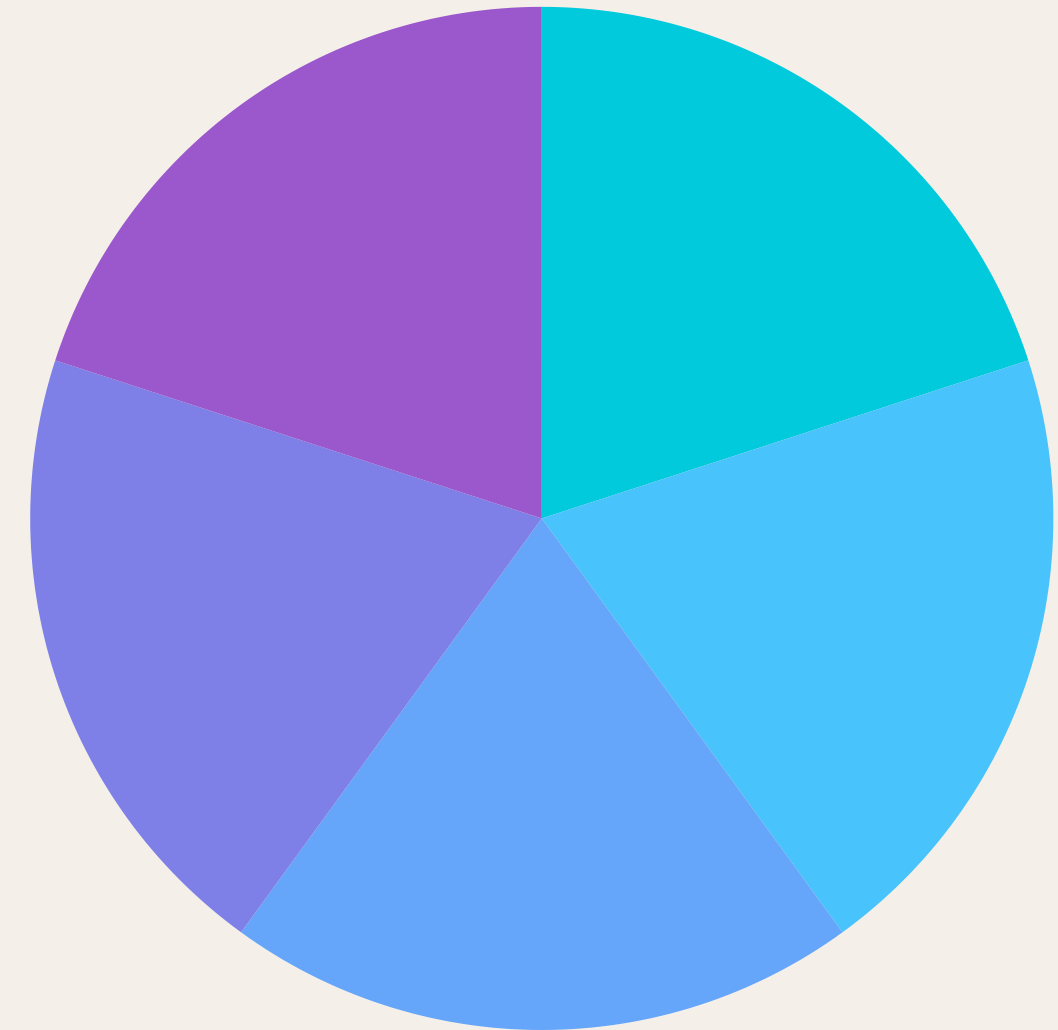
- Technological Advancements: Evolving aircraft technology may introduce safety features not captured in historical data.
- Data Completeness and Accuracy: It is assumed that the historical accident data used for this analysis is complete and accurately reflects all relevant incidents.

Assumptions help in understanding the context and limitations of the analysis.

Data Overview

Source:

The data is sourced from the National Transportation Safety Board. It includes aviation accident data from 1962 to 2023 about civil aviation accidents and selected incidents in the United States and international waters.



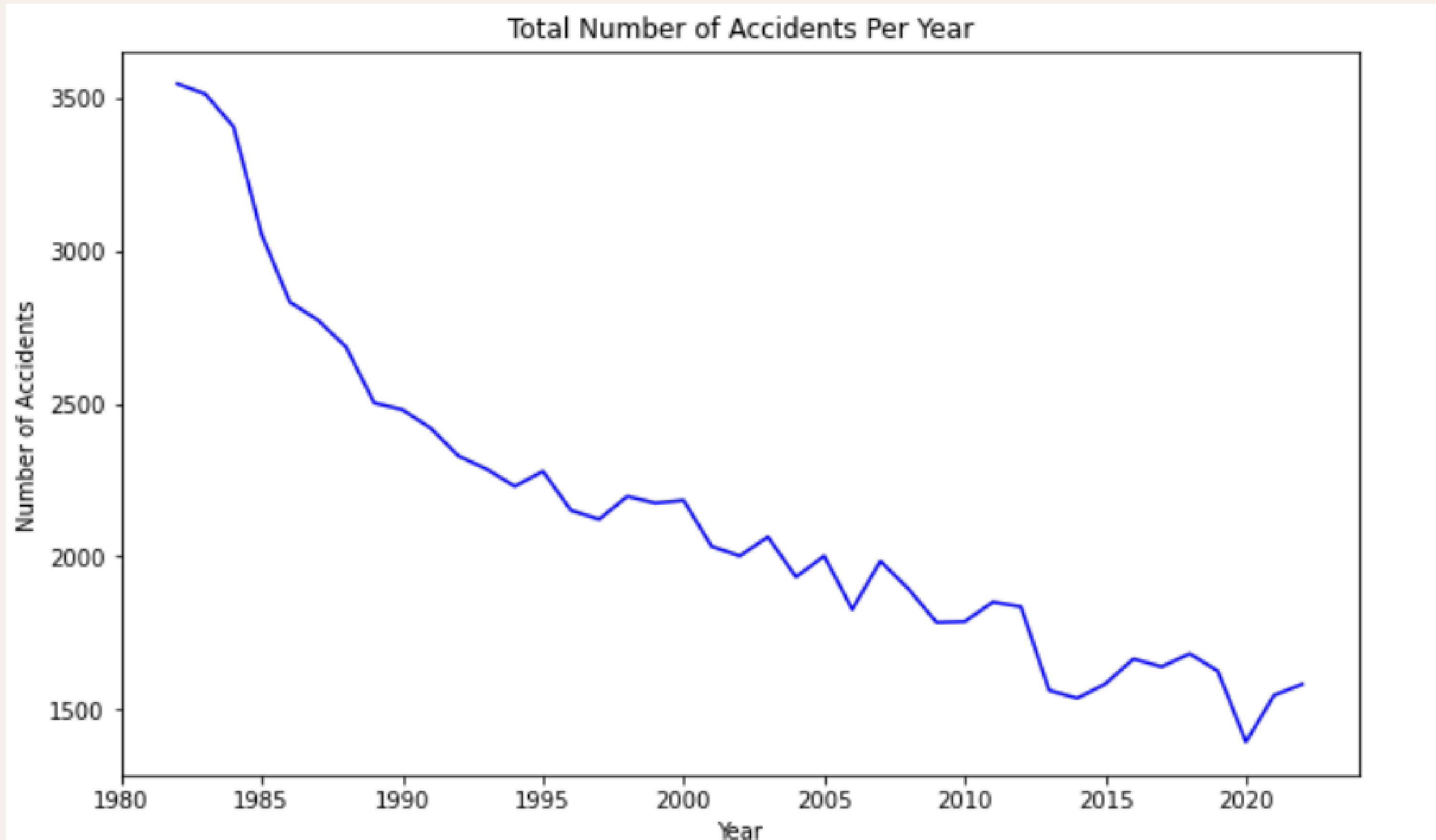
Data Description

The dataset contains records of aviation accidents from 1962 to 2023. Each record includes various attributes that can be analyzed for trends and insights.

Key attributes used include Accident Number, Event Date, Aircraft Damage, and Make & Model.

These attributes provide valuable insights into areas such as Accident Trends, Risk Assessment, Aircraft Reliability, and Environmental Influence.

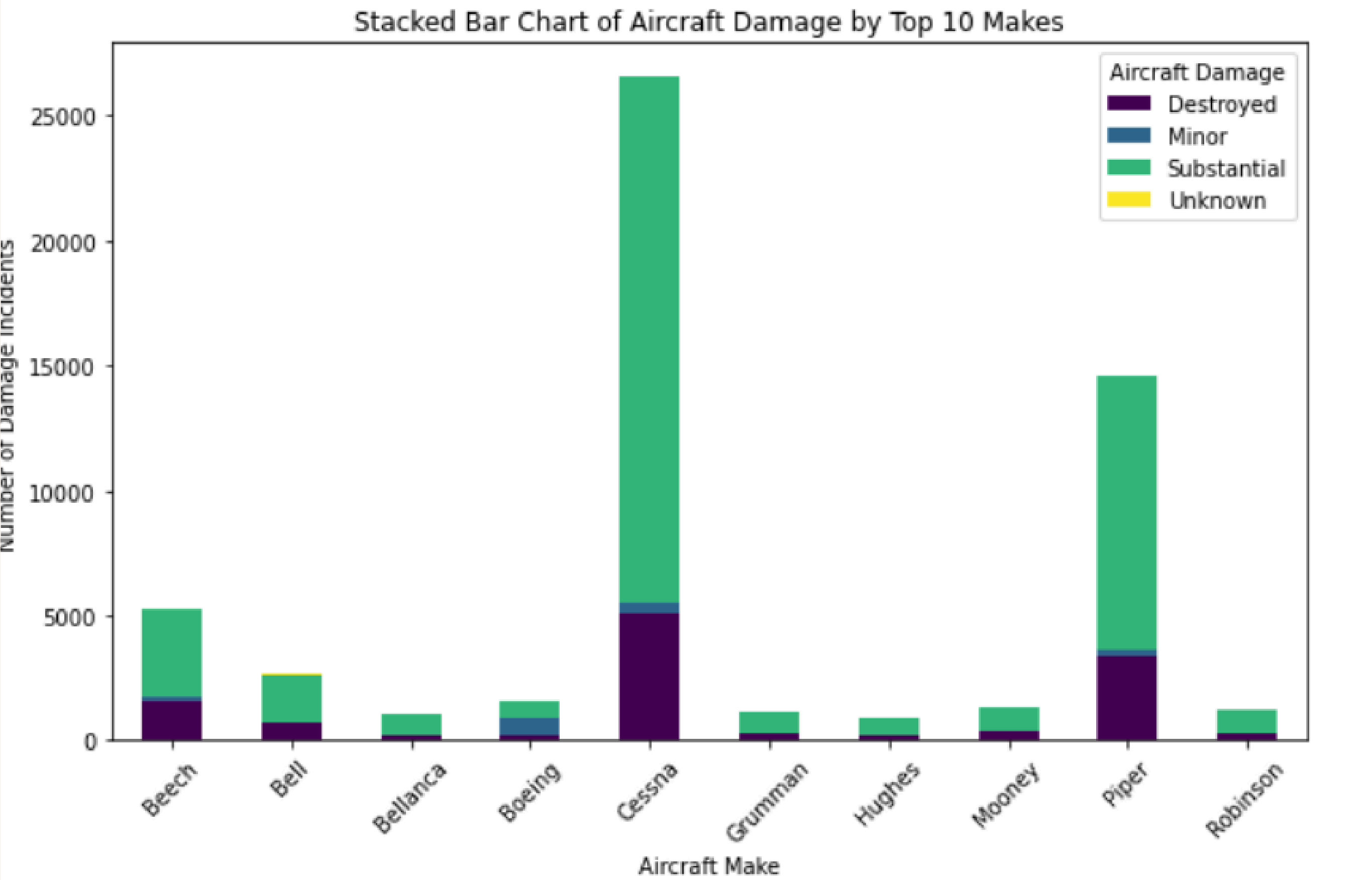
Accident Trends Over Time



Analysis of Accident Trends Over Time

As seen in the line graph, between the period of 1962 and 1981, the records found were very limited and could not be used in the analysis. However, after 1982, the data indicates a steady decline in the number of accidents. This trend could be associated with multiple factors, including advancements in aviation technology, changes in safety regulations, or improved operational practices. Further analysis may be needed to understand the specific reasons behind this decline.

Aircraft Make by Damage

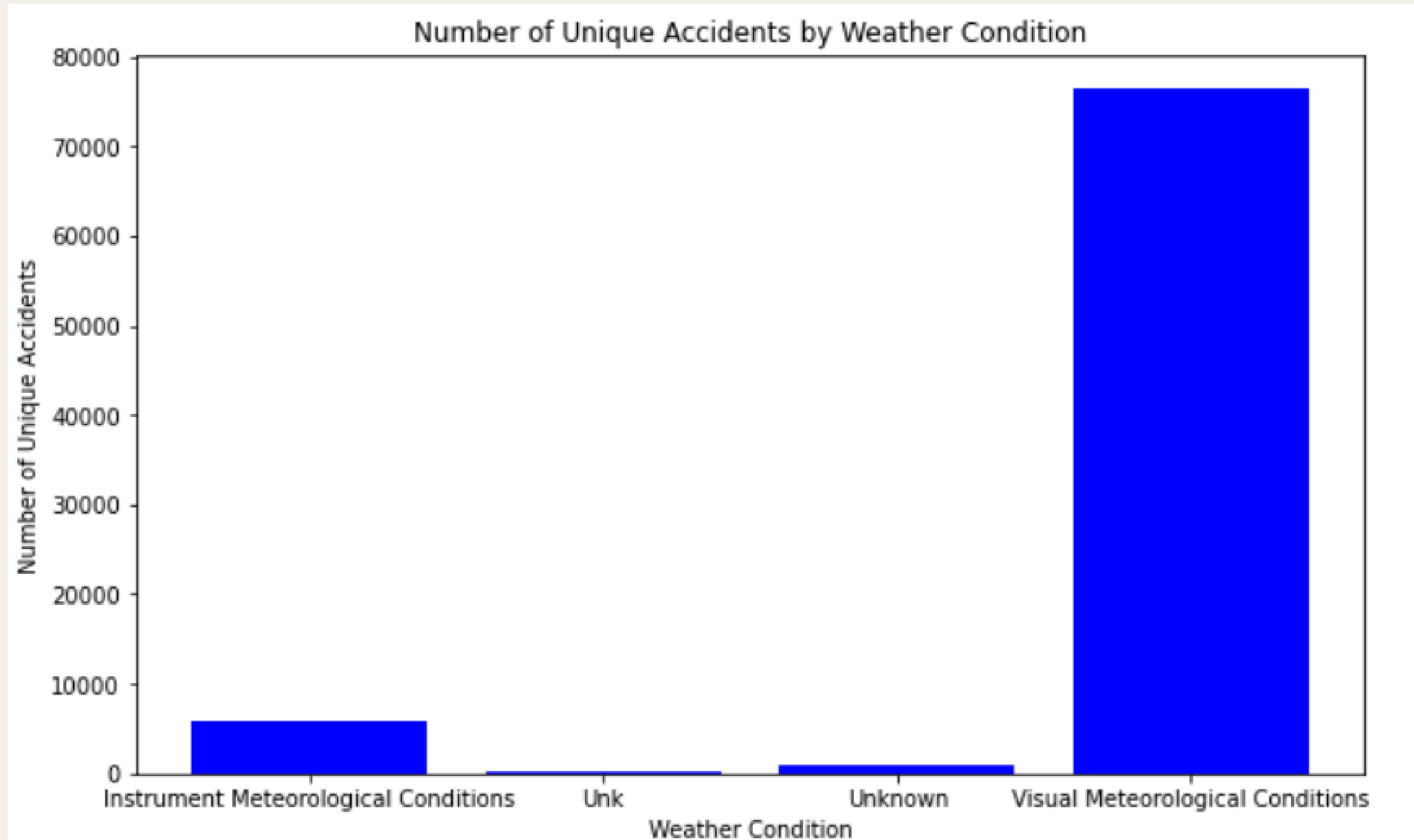


Analysis of Aircraft Make by Damage

As seen in the stacked bar chart, the analysis reveals that the top 10 aircraft 'Make' with the highest recorded accidents as seen in the previous bar chart are: Cessna, Piper, Beech, Boeing, Bell, Mooney, Robinson, Grumman, Bellanca, and Hughes, with Cessna, Piper, and Beech(In that order) suggesting a potential correlation between their prevalence and operational use.

When assessing aircraft damage, the ranking shifts slightly to Cessna, Piper, Beech, Bell, Mooney, Robinson, Boeing, Grumman, Bellanca, and Hughes(In that order); while Cessna, Piper, and Beech remain in the top three, Boeing ranks lower, indicating variations in damage severity.

Accidents in Varying Weather Conditions



Analysis of Accident in Different Weather Conditions

We see that more accidents occur in Visual Meteorological Conditions than in Instrument Meteorological Conditions. This highlights the importance of ongoing analysis together with training and safety initiatives.

Conclusions

- The steady decline in the number of accidents since 1982 highlights a positive trend in aviation safety, likely attributed to advancements in technology, stricter safety regulations, and better operational practices.
- The top 10 most common aircraft models in accidents are Cessna, Piper, and Beech, which dominate the accident statistics. While these models are popular and widely used, they may carry higher risks. However, the data on aircraft damage shows some variation, with Boeing ranking lower in damage severity compared to its accident frequency, indicating that certain models might withstand damage better or be involved in less severe incidents.
- A higher number of accidents occurred under Visual Meteorological Conditions (VMC) compared to Instrument Meteorological Conditions (IMC), suggesting that pilots may be more prone to accidents during seemingly favorable weather. This emphasizes the need for better pilot training and stricter operational practices even under VMC.



Recommendations

- Focus on Newer Aircraft Models with Improved Safety Features To minimize risk.
- Thorough Risk Assessment of Popular Aircraft Models Cessna, Piper, and Beech are frequently involved in accidents, suggesting they may pose higher risks due to their operational prevalence. Consider models like Boeing, which show lower damage severity in accidents, indicating better resilience.
- Enhance Training and Safety Programs in Favorable Weather to mitigate risks and improve overall aircraft safety performance.

Thank You

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