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Aircraft Safety Analysis

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Business Overview

Our company plans to invest in commercial and private aircraft.

To reduce financial and human risk, we need to understand which aircraft are safest based on historical accident data.

This analysis supports data-driven decision-making as we enter the aviation market.

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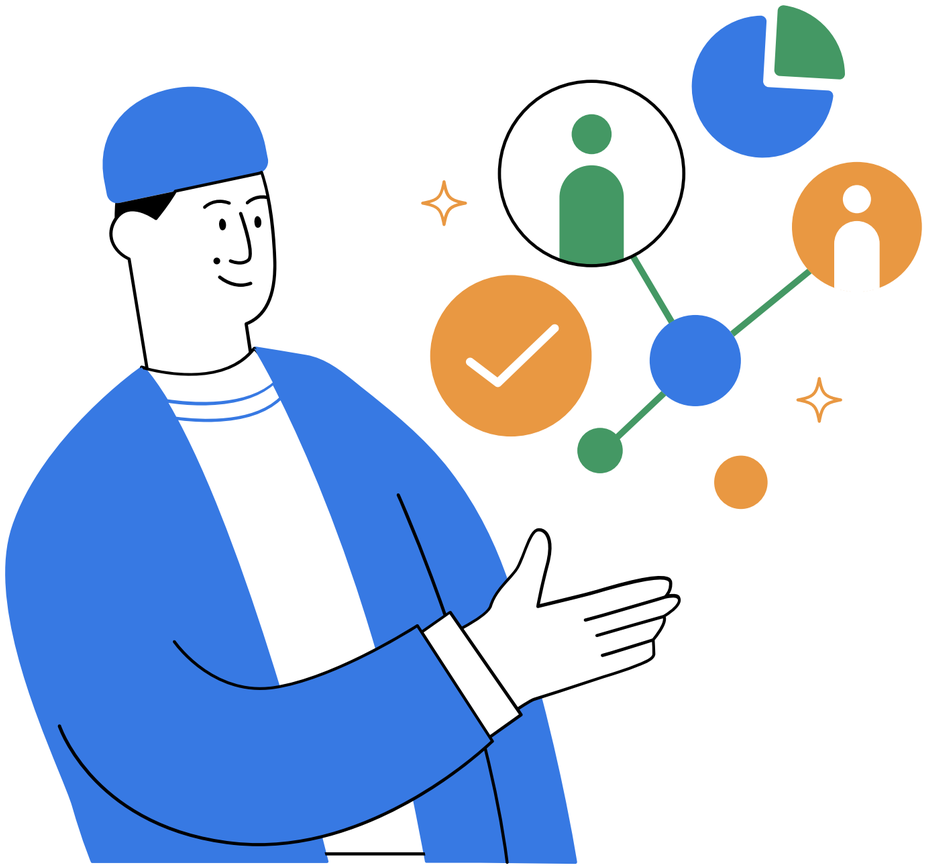
Business Questions

- Which aircraft types are involved in the fewest accidents?
- Are there specific manufacturers with consistently safer records?
- What time periods or flight phases are most risky?
- Do weather conditions influence accident severity?



📝 These questions guide the analysis and help uncover insights for safer investment decisions in the aviation market.

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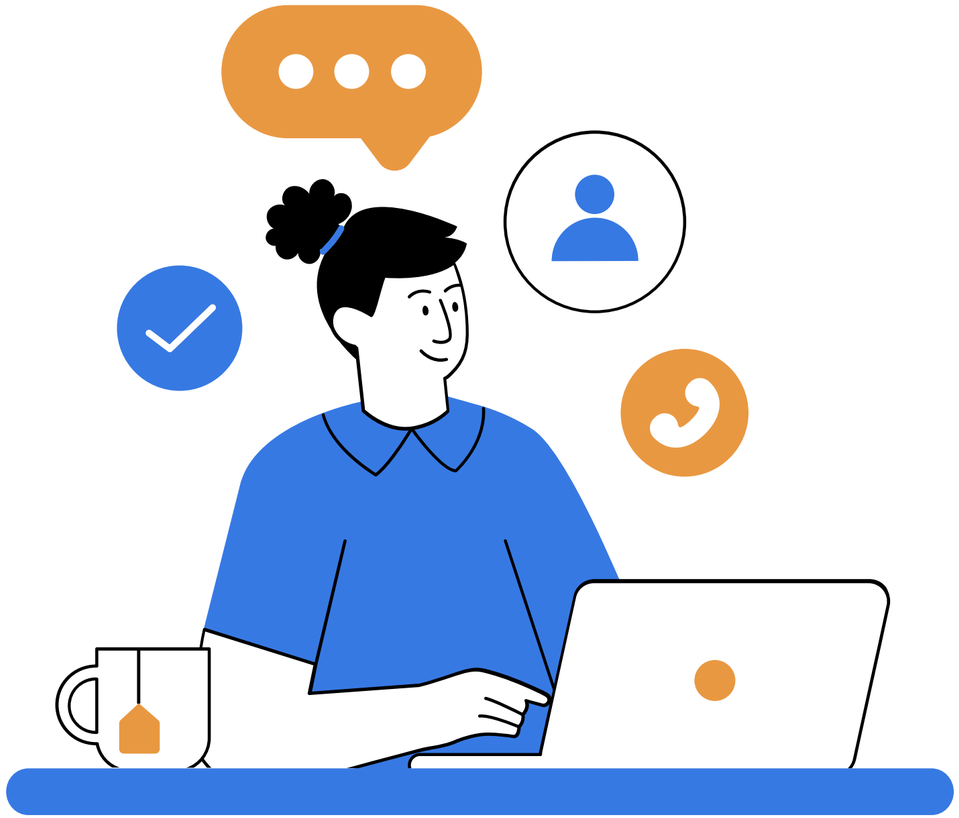
Dataset Overview



- Source: National Transportation Safety Board (NTSB)
- Time Span: 1962 to 2023
- Key Columns Used:
  - ✈️ Make – The manufacturer of the aircraft
  - ⚠️ Injury Severity – Indicates severity (e.g., Fatal, Serious, Minor)
  - 📍 Phase of Flight – When the accident occurred (e.g., Landing, Takeoff)
  - 🌦️ Weather Condition – IMC (Instrument) or VMC (Visual)
  - 🕒 Event Date – Date of the accident

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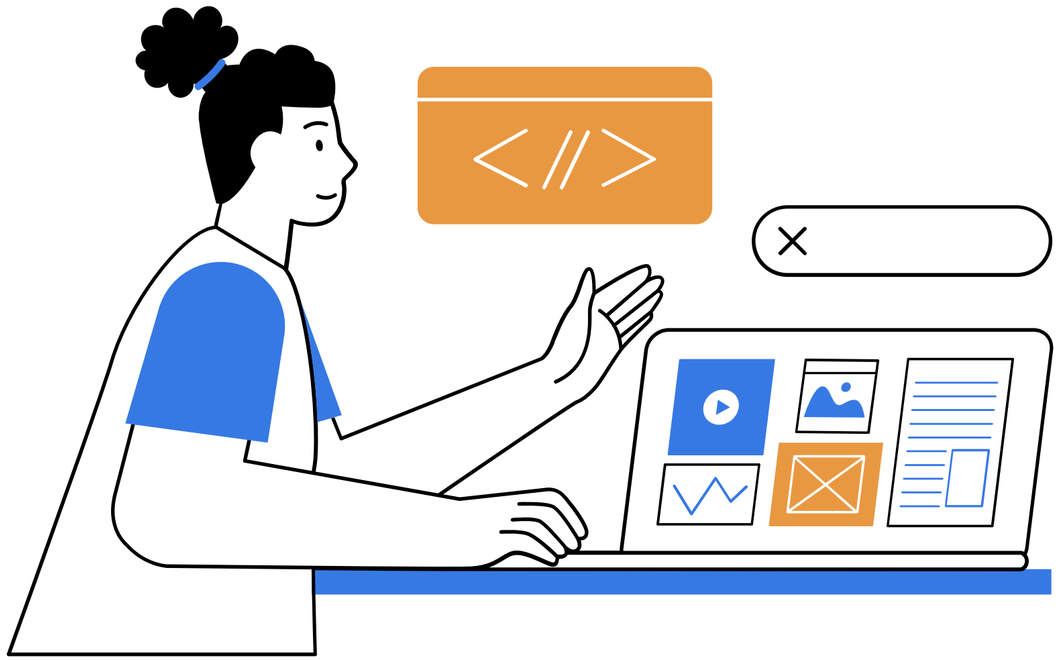

Data Preparation

🧪 Handled Missing Values:

- Dropped columns with more than 60% missing data
- Cleaned and filled remaining missing values appropriately

🧮 Processed Variables:

- Converted text columns to categorical for analysis
- Transformed date-related columns for time-based analysis

🚦 Simplified Severity Levels:

- Created a new column: Simplified_Severity
- Grouped injury levels into: Minor, Serious, and Fatal

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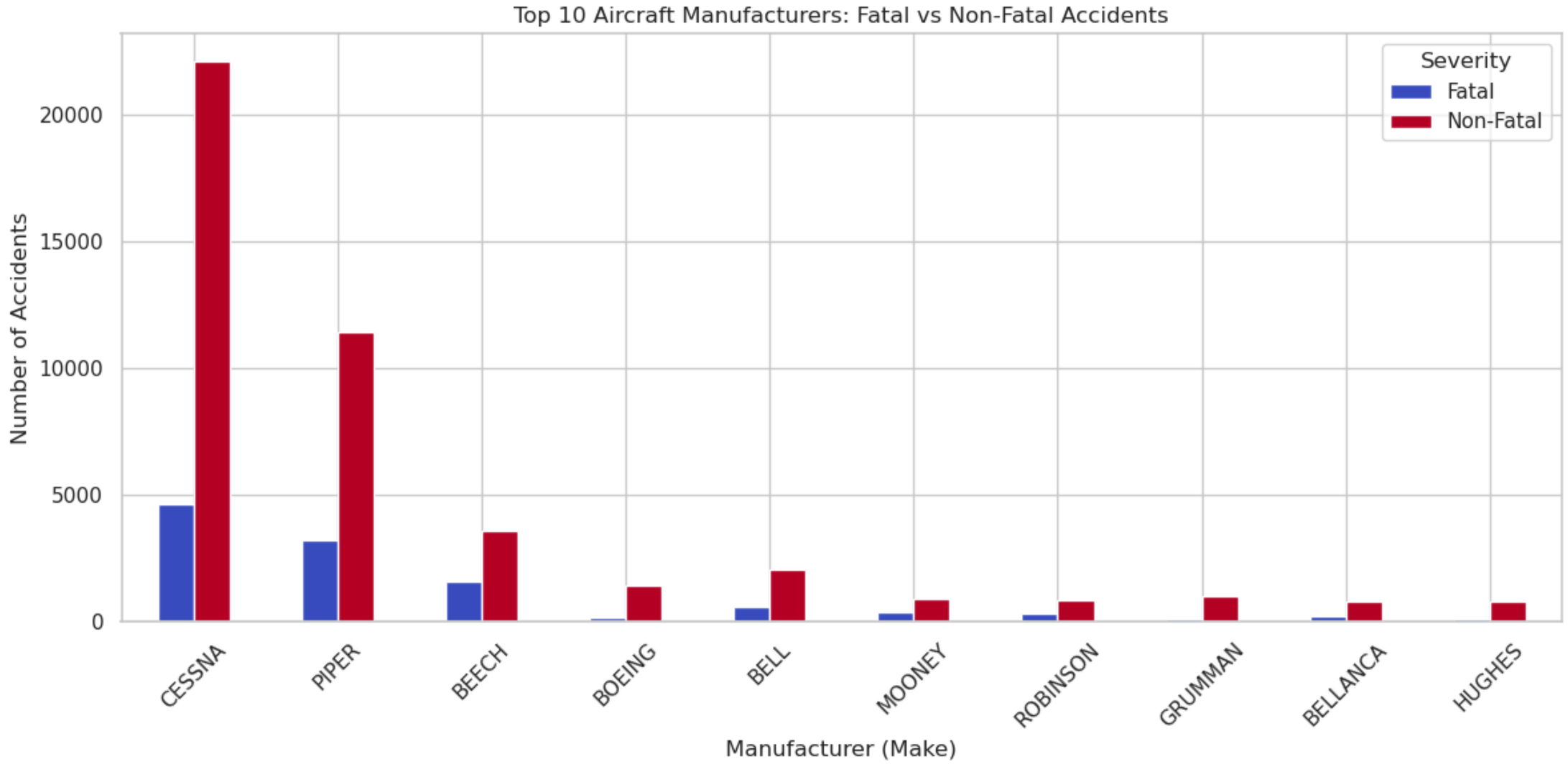
Accident Severity by Aircraft Manufacturer



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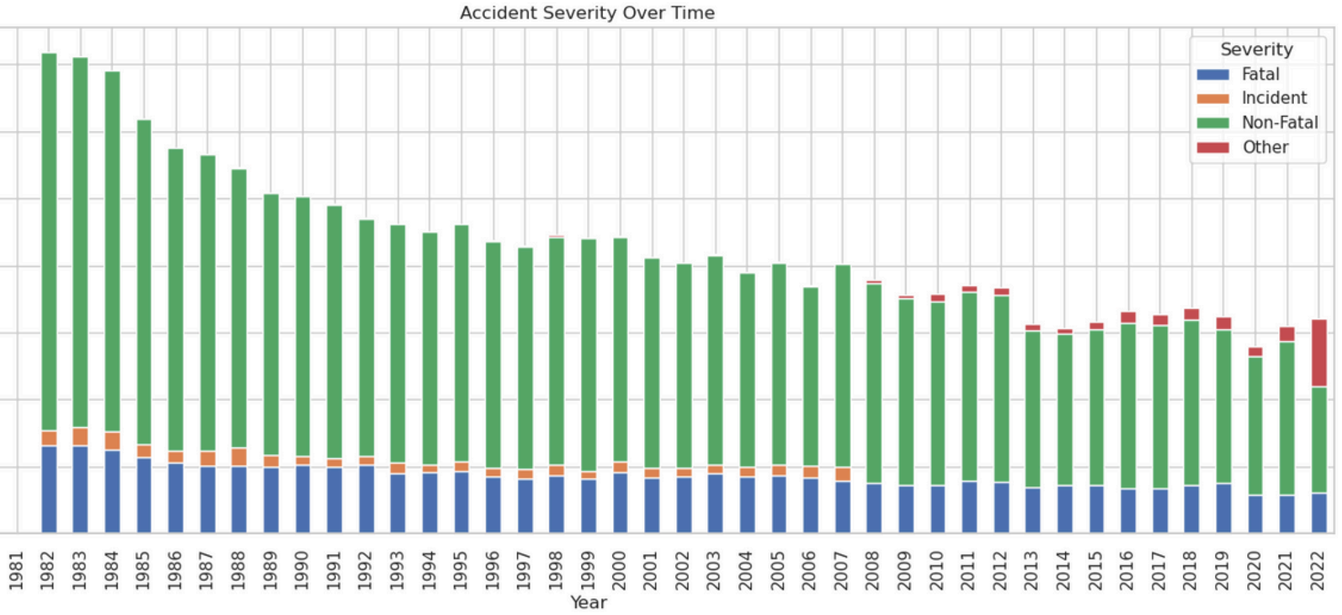
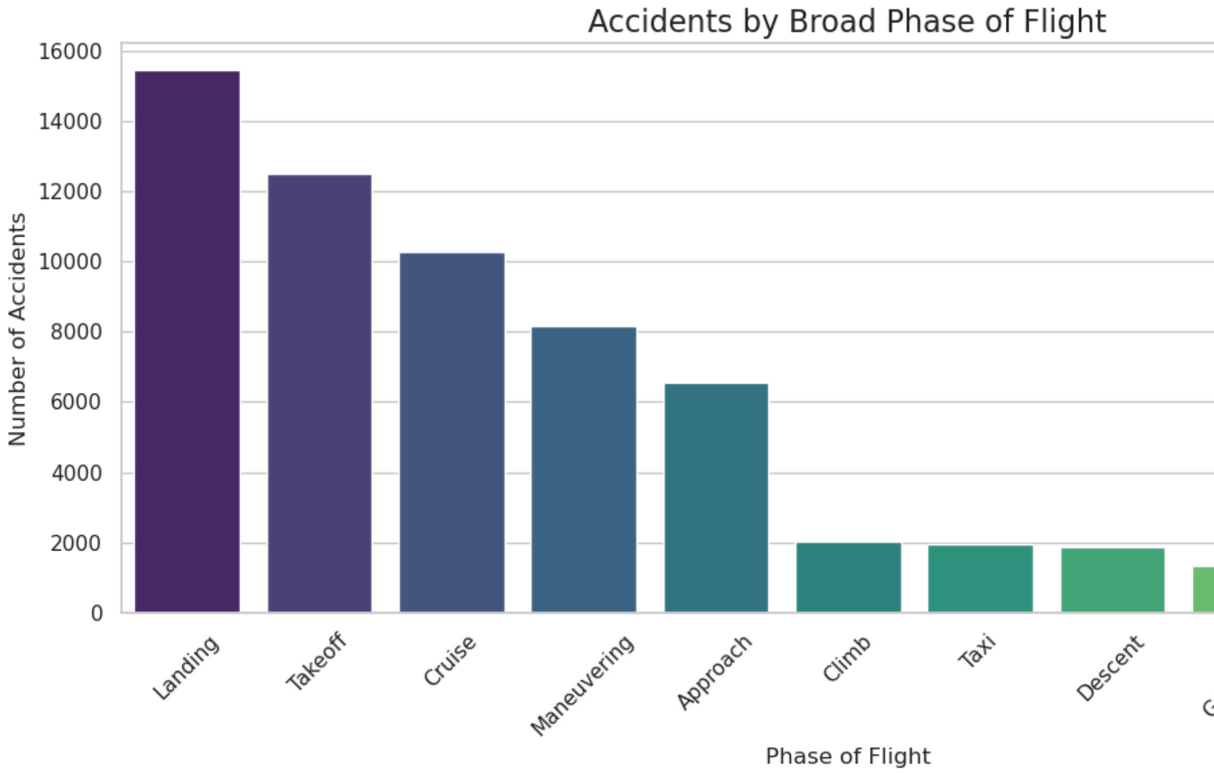
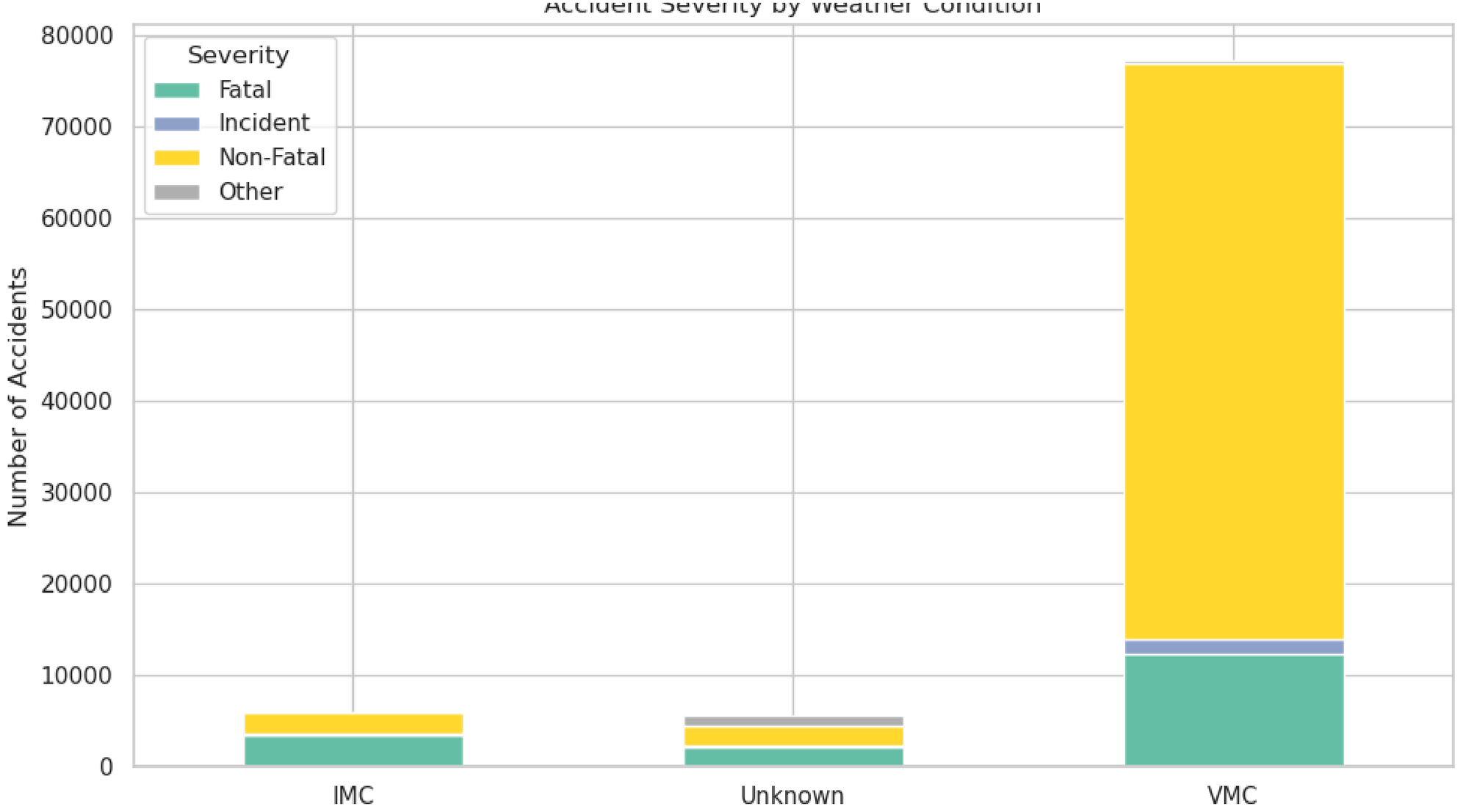
Risky Time Periods or Flight Phases using severity data across flight phases.





Accident Severity by Weather Condition



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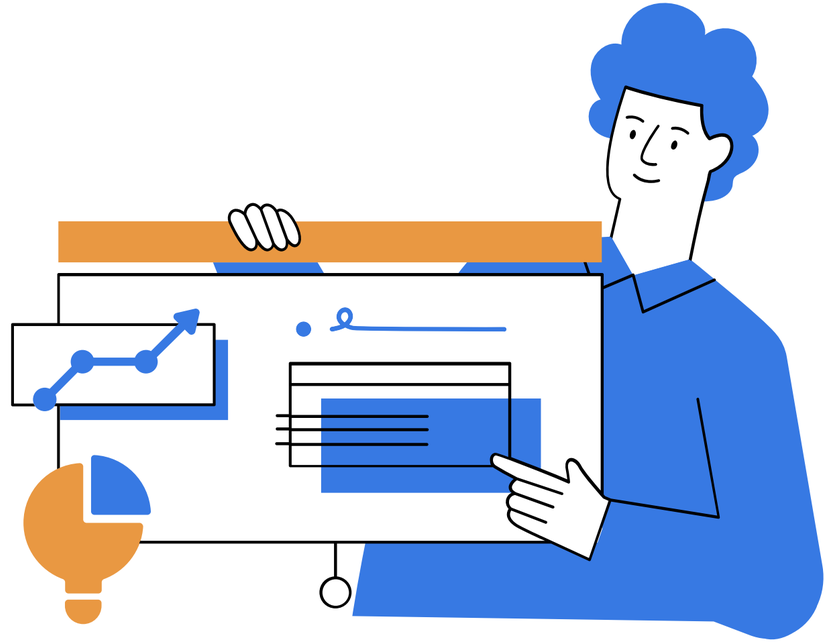

Business Recommendations

Aircraft types such as the Cessna 172 and Boeing 737 recorded notably fewer serious accidents across the dataset. These models demonstrate strong safety records and are ideal candidates for initial fleet selection in order to minimize operational risk and improve passenger confidence.

In terms of manufacturers, Boeing consistently showed a lower number of fatal and serious accidents compared to others like Cessna and Piper. This trend suggests a higher standard in design, production, and possibly pilot support systems. Investing in aircraft from safer manufacturers can improve long-term safety outcomes.

Additionally, the Landing and Maneuvering phases were linked to the most severe incidents. These phases should be prioritized for enhanced training programs, safety simulations, and real-time risk monitoring. A proactive focus on these critical moments can significantly reduce accident severity and improve overall flight safety standards.

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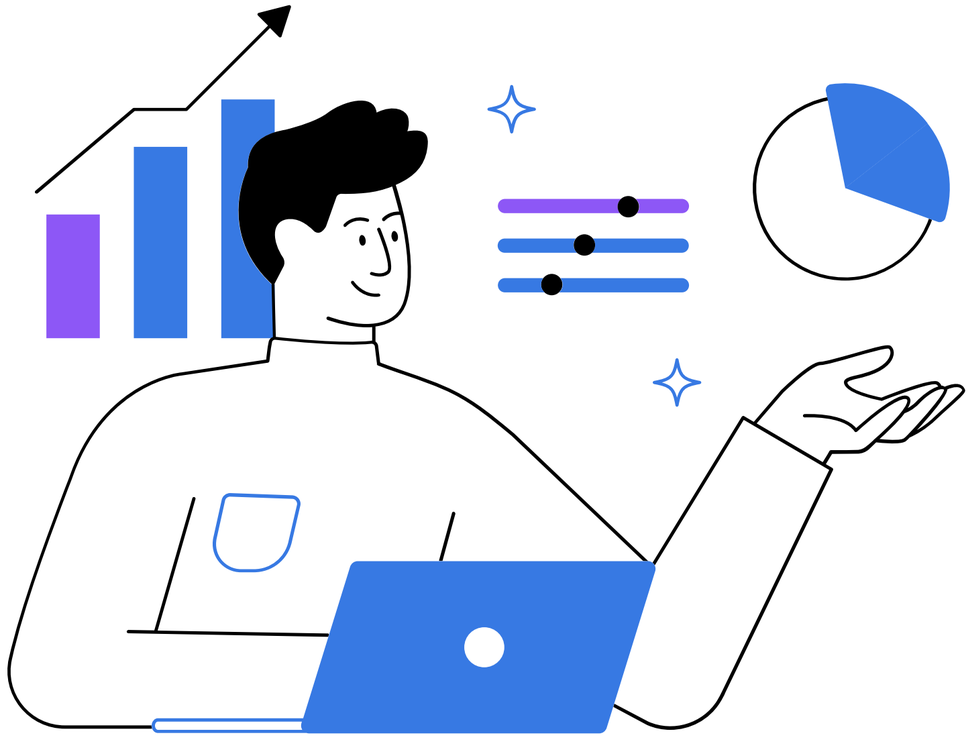
what can be done beyond your current analysis ?



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Thank You

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