Aviation Risk Analysis for Aircraft Acquisition

Identifying Low-Risk Aircraft Types Using Historical Accident Data

Overview

- Goal: identify aircraft types with the lowest risk profiles.

- Company expanding into the aviation industry (commercial & private operations).

- Stakeholder: Head of Aviation Division.

- Purpose: provide safety insights to reduce risk & guide investment.

Business Understanding

Business Problem & Objectives:

▶ Company expanding into the aviation industry.

▶ Need to identify low-risk aircraft types and manufacturers.

▶ Analyze accident trends.

▶ Goal: Support data-driven purchasing decisions.

▶ Success criteria: actionable recommendations for safer aircraft acquisition, clear visuals, interactive dashboard.

Data understanding

Data Overview:

▶ Source: National Transportation Safety Board (NTSB).

▶ Coverage: 1962–2023, US and international waters.

▶ Columns: Aircraft type, manufacturer, year, fatalities, location, accident date, severity, etc.

Accident Counts by Manufacturer

▶ Accident Counts by Manufacturer chart:
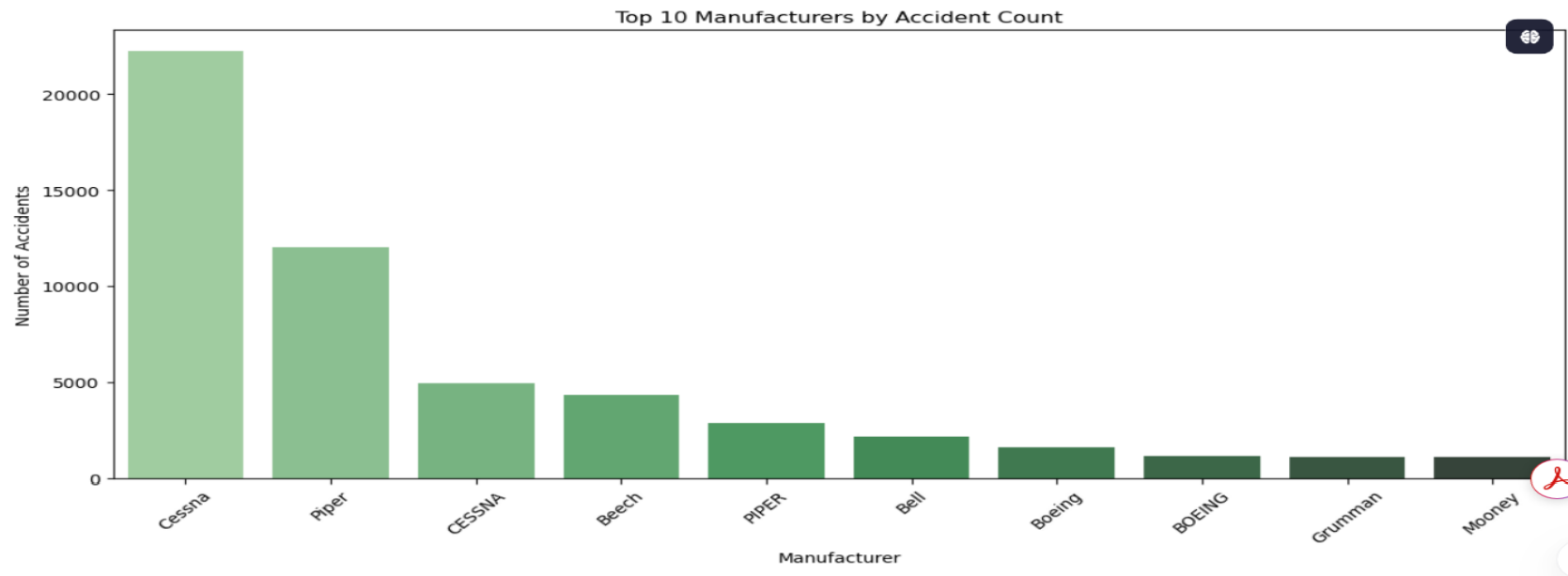
▶ Cessna & Piper have the highest accident counts.

▶ Mooney, Beechcraft have fewer accidents.

▶ High counts are partly due to fleet size & popularity.

▶ Takeaway : Accident concentration is highest in popular manufacturers (Cessna, Piper).
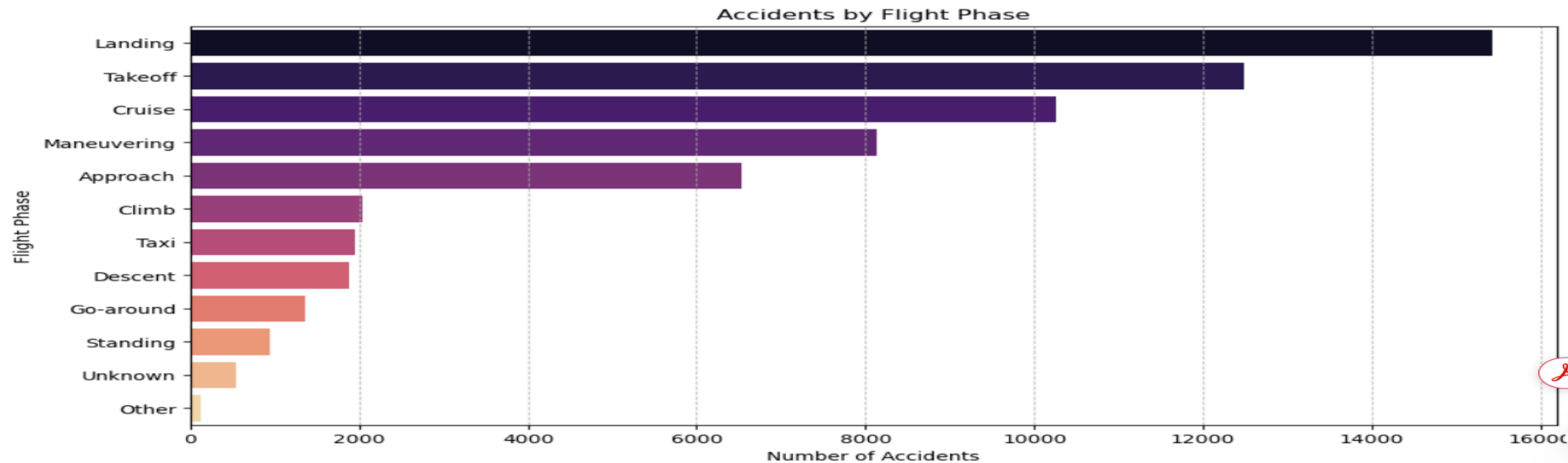
Accident Trends Over Time

- Accident Trends Over Time (1962–2023) chart:

Number of Accidents Over Time (1962-2023)
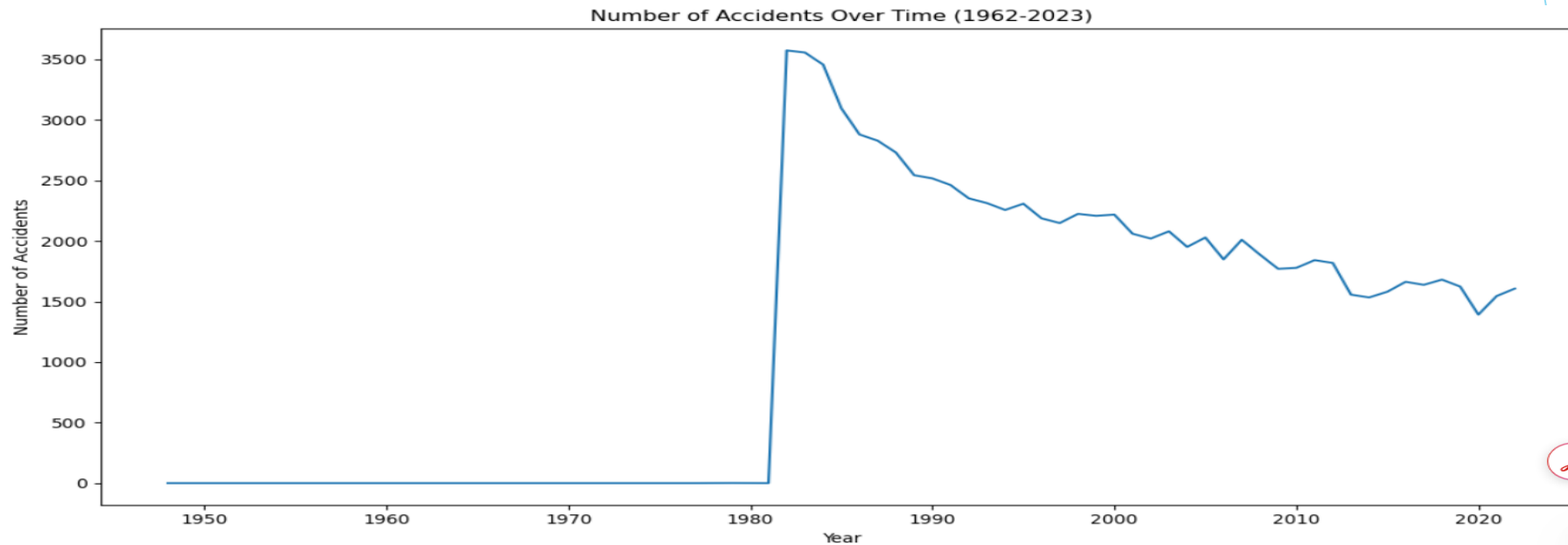
- Peak in accidents around the 1980s.

- Steady decline since mid-1980s.

- Small fluctuations after 2000s.

- Takeaway: Overall, accidents have decreased, showing strong safety improvements.

Accident by Flight Phase

▶ Accident by Flight Phase chart:

▶ Landing is the most accident-prone phase.

▶ Takeoff also shows a high risk.

▶ Cruise, maneuvering, and approach contribute significantly.

▶ Takeaway : Critical phases (Landing & Takeoff) account for most accidents.

Key Findings

▶ Cessna & Piper have the **highest accident counts** (due to wide usage).

▶ Accident rates have **declined since the 1980s**, showing safety improvements.

▶ Most accidents occur during the **Landing and Takeoff** phases.

▶ Smaller manufacturers like **Mooney** show fewer reported accidents.

▶ **Takeaway:** Safety has improved overall, but **critical phases & high-use aircraft** remain risk areas.

Recommendations

Key Recommendations:

▶ Prioritize acquisition of **aircraft with lower accident records** (e.g., Mooney, Beechcraft).

▶ Invest in **training & safety protocols** for Landing/Takeoff.

▶ Consider **modern aircraft models** benefiting from post-1980s safety improvements.

▶ Use findings to **guide procurement & operational risk management**.

▶ **Takeaway:** A **balanced strategy**: safe aircraft choices and strong pilot training to minimize risks.

Conclusion

▶ Accident data reveals **clear safety trends** over decades.

▶ Manufacturers & flight phases play a major role in accident risk.

▶ Data-driven insights enable **smarter, safer fleet acquisition**.

Project Links

- **Project Links**

- **GitHub Repository** (Technical Project): github.com/Morvine-otieno/dsc-phase-1-project-v3

- **Tableau Dashboard** (Interactive Visualization): Aircraft Safety Risk Dashboard on Tableau Public

Thank You

💬 **Questions?**

📌 **Contact Information**

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✈ *"Safer skies through data-driven decisions."*