

AIRCRAFT RISK ANALYSIS

Identifying Low-Risk Aircraft
For Company Expansion



Introduction

- The aviation industry has grown rapidly, with a wide variety of aircraft used for commercial, private, and cargo purposes.
- While air travel is generally safe, accidents still occur and can result in fatalities, property loss, and operational disruptions.
- This project investigates which aircraft has low risks to guide decision-making for company expansion.

Business Understanding

- Our company is expanding into the aviation industry to diversify its portfolio.
- Key challenge: Selecting aircraft types with the lowest operational risks.
- Safety performance directly affects costs, reputation and customer trust.
- Understanding accident patterns and risk factors helps guide data-driven investment decisions.
- Outcome: Identify aircraft models that minimize risk and maximize operational safety.

Data Understanding

Source: Historical aviation accident dataset

Scope: Covers accidents over multiple years, across different aircraft models and categories.

Size: 90,348 records across 31 columns from the year 1919-2023

Key Variables:

- Aircraft details: Make, model, number of engines, category
- Accident details: Date, location, flight phase, weather conditions
- Outcome: Injuries, fatalities, severity classification

Data Quality: Some missing values (like location, weather, number of injuries), which were dropped or filled with unknown or zero. The data types were standardized and duplicates removed.

Goal: Use this dataset to identify accident patterns and measure aircraft safety.

Data Analysis

Exploratory Data Analysis (EDA):

- Checked distributions of accidents and fatalities across aircraft types.
- Identified high-risk vs. low-risk aircraft manufacturers.

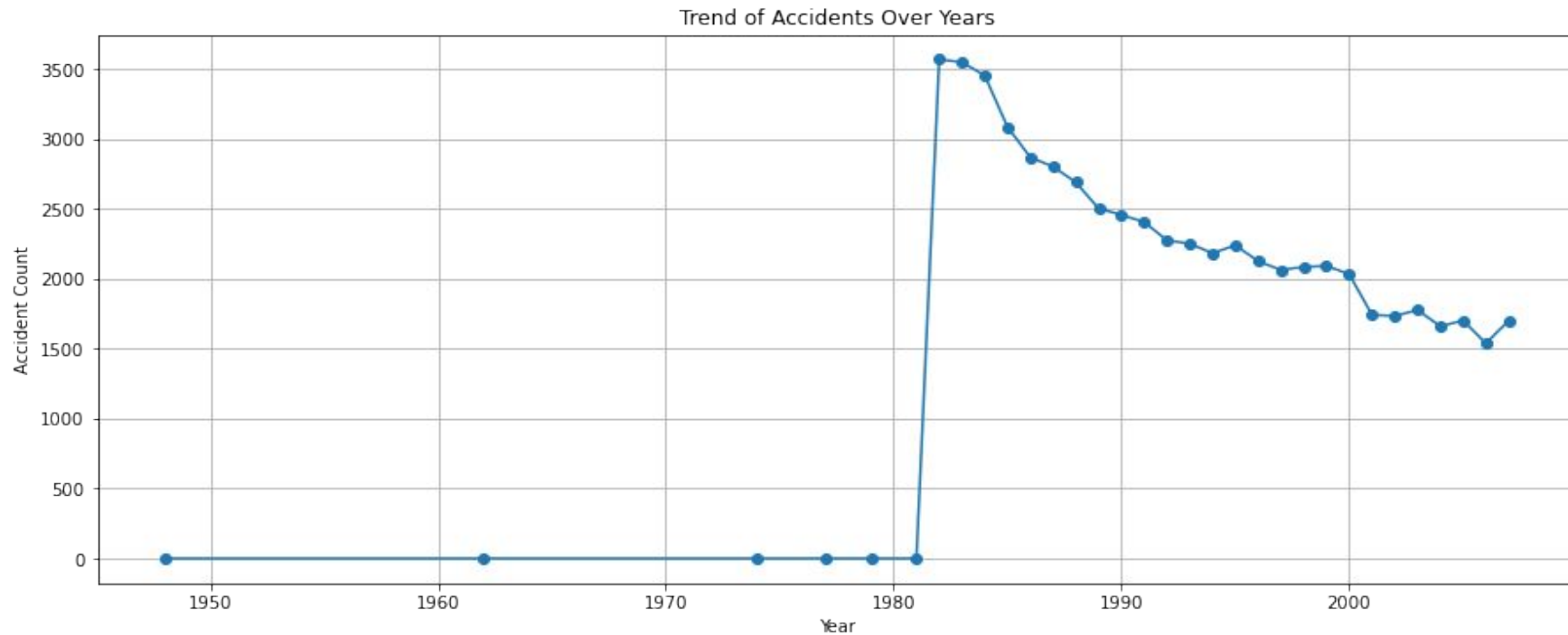
Trends Over Time: Analyzed accident frequency across years → overall decline in recent years.

Flight Phase Analysis: Most accidents occur during takeoff and landing.

Weather Impact :Poor weather conditions correlated with higher accident severity.

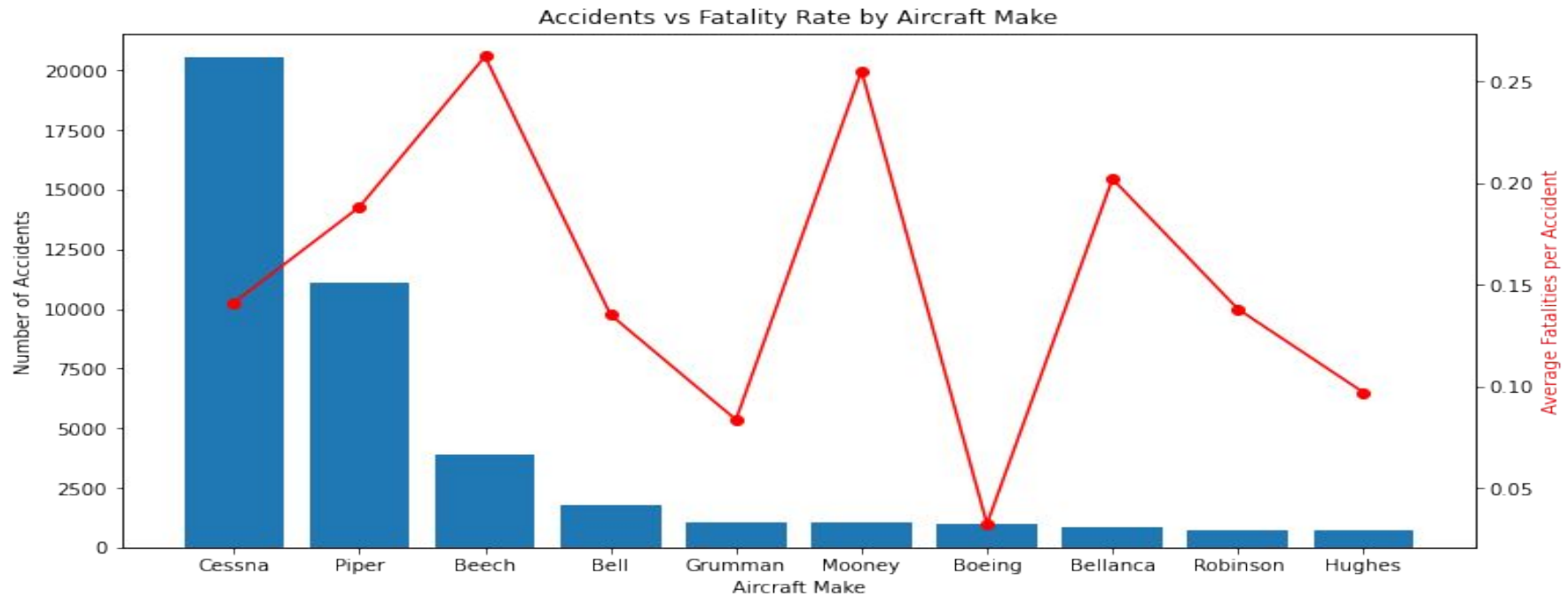
Comparative Metrics: Calculated accident count and fatality rate per aircraft type.

Visualizations



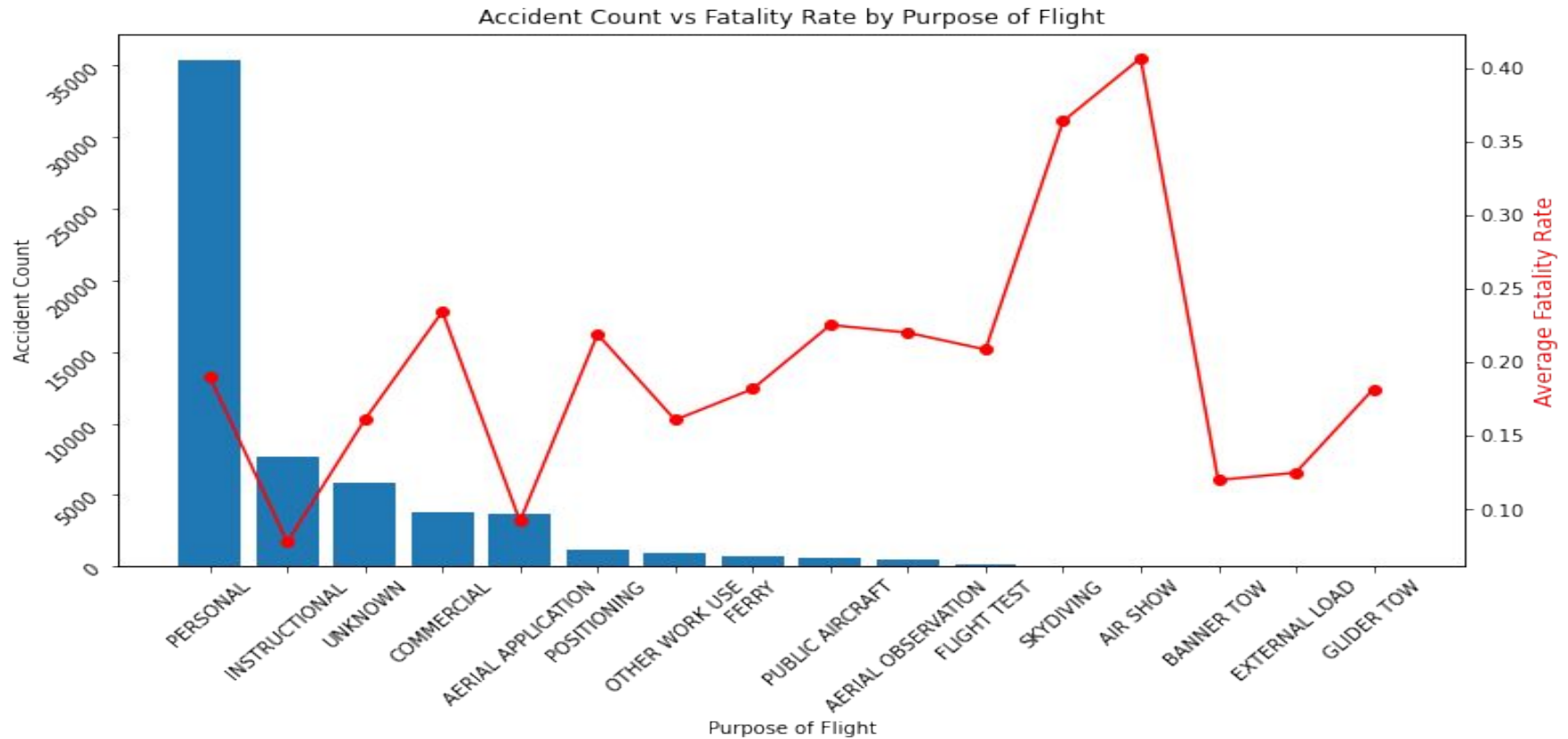
Insight:

There has been a decline in accidents over the recent decades which may be due to technological advances over time.



Insight:

Boeing displays the least accidents and the least fatality rate compared to the other manufacturers.



Insight: The private aircrafts are seen to be involved in a lot of accidents compared to the commercial flights. Though the fatality rate of the commercial is high which is due to the large number of passengers compared to private ones.

Recommendations

1. Prioritize safer aircraft models with strong safety records.
2. Focus on a sector with low accidents i.e commercial.
3. Implement additional safety measures during high-risk phases (takeoff/landing).
4. Invest in weather monitoring and airport safety infrastructure.
5. Enhance training and fatigue management for pilots.
6. Take on insurance which will ensure standards and regulations are met with constant inspection.