Aviation Accident Risk Analysis & Recommendations

A Comprehensive Review on Aviation Safety and Investment Insights

Outline

- Business Problem
- Data
- Methods
- Results
- Conclusions

Business Problem

Objective:

To analyze aviation accident data from 1960 to 2023 and provide insights on the safest aircraft models, airports, and risk factors for investment purposes.

Why This Matters:

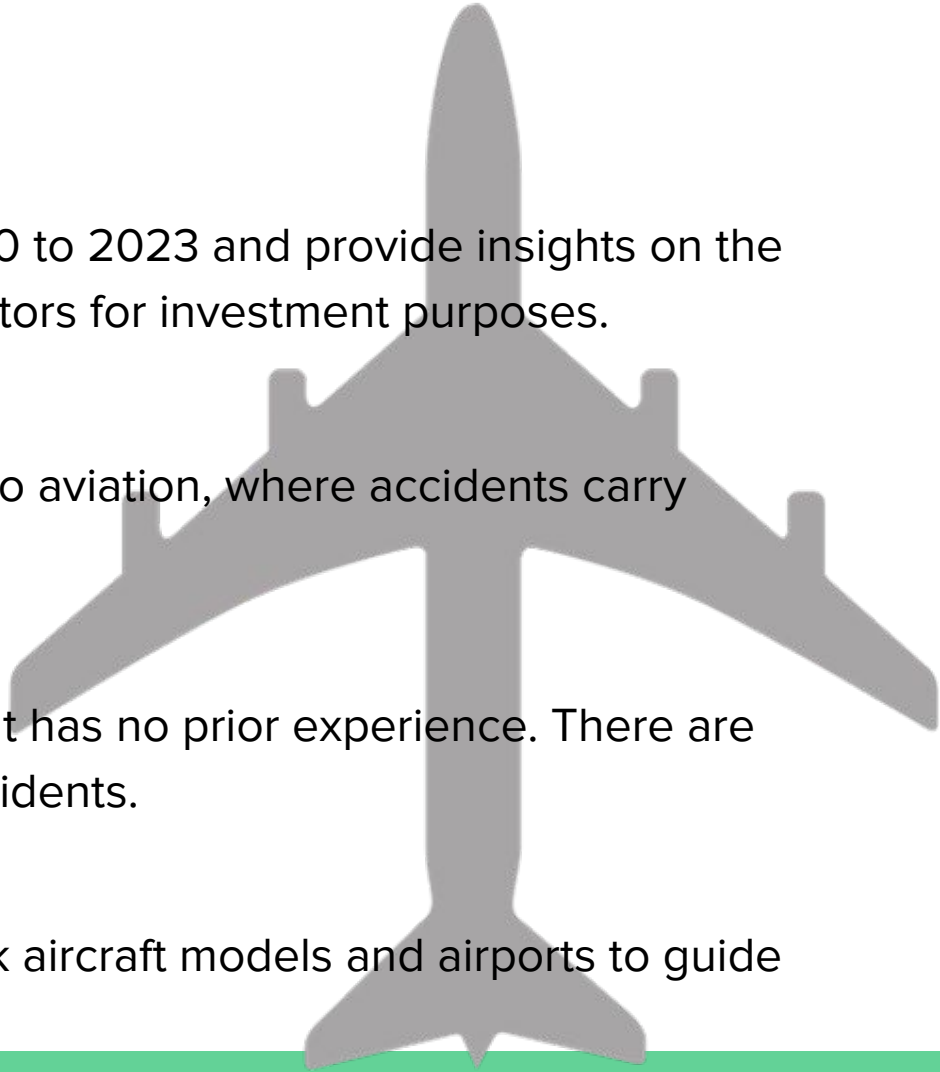
The company is diversifying its portfolio into aviation, where accidents carry significant reputational and financial risks.

Problem Statement:

The company is expanding into aviation but has no prior experience. There are potential risks associated with Aviation accidents.

Goal:

Use data-driven analysis to identify low-risk aircraft models and airports to guide investment decisions.



Data

Source:

- National Transportation Safety Board (NTSB) Aviation Data (1960-2023).

Key Fields:

- Aircraft Make/Model
- Injury Severity
- Flight Purpose
- Weather Conditions
- Broad Phase of flight
- Aircraft damage

Data Summary:

- 88,889 rows, 31 columns
- Event, aircraft, and injury details
- Location and weather data
- Investigation outcomes

Analysis Focus:

- Aviation accidents that occurred in USA.
- Airplanes and helicopters only
- 26,324 rows and 27 columns.

Methods

1. **Data Cleaning & Preprocessing**:
- Handling missing values
- Standardizing values

2. **Data Imputation**:
- Filling in missing values

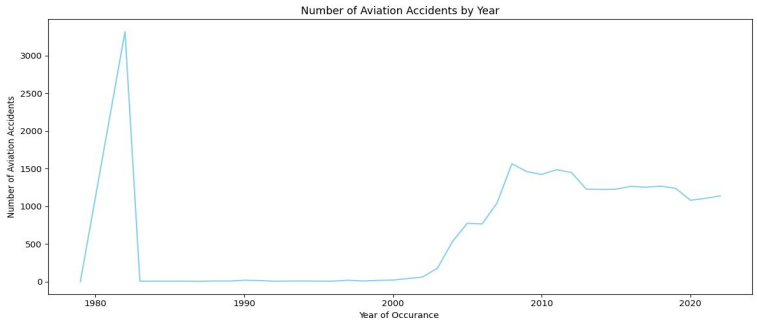
3. **Data Analysis**:
- Grouping accidents by aircraft model, airport, and flight phase
- Analyzing injury severity and accident conditions

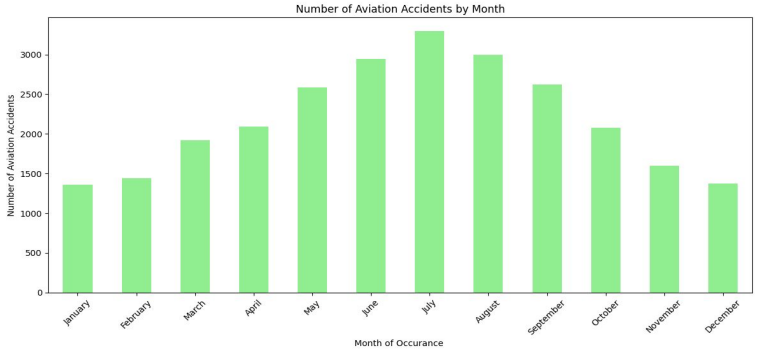
4. **Visualization:**
- Generating bar charts, line plots, and heatmaps for insights

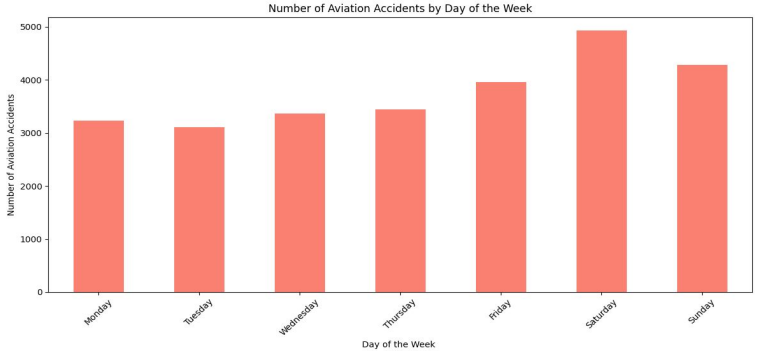
Results

Aeroplane and Helicopter accidents in the USA

- There was a long period of no accidents from 1983 to 1996 when there were few accidents reported but from 2000 to 2008 there was a progressive increase with a plateau from 2010.
- Most of the accidents occur in July and during the weekend (Saturday and Sunday).
- Airplanes account for the vast majority of Accidents (23,657) than helicopters(2,667)
- Most aviation accidents occurred in California-CA(2,559), Texas-Tx (2,186), and Florida-FL(1,887)







Key Insights – Risk Analysis

Injury Severity & Weather Conditions:

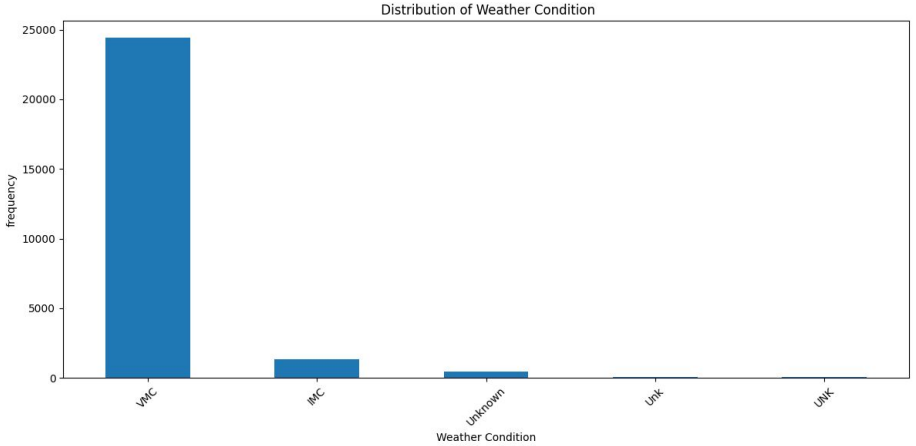
- Most accidents occur during good weather (VMC)
- Majority of accidents happen during landing or takeoff

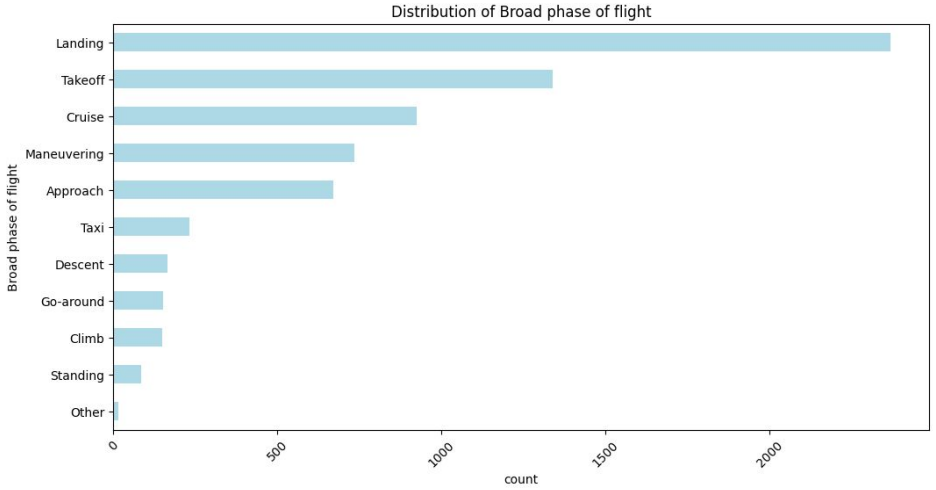
Aircraft Damage:

- Most accidents result in substantial aircraft damage
- Damage types are consistent across various phases of flight

Flight Purpose:

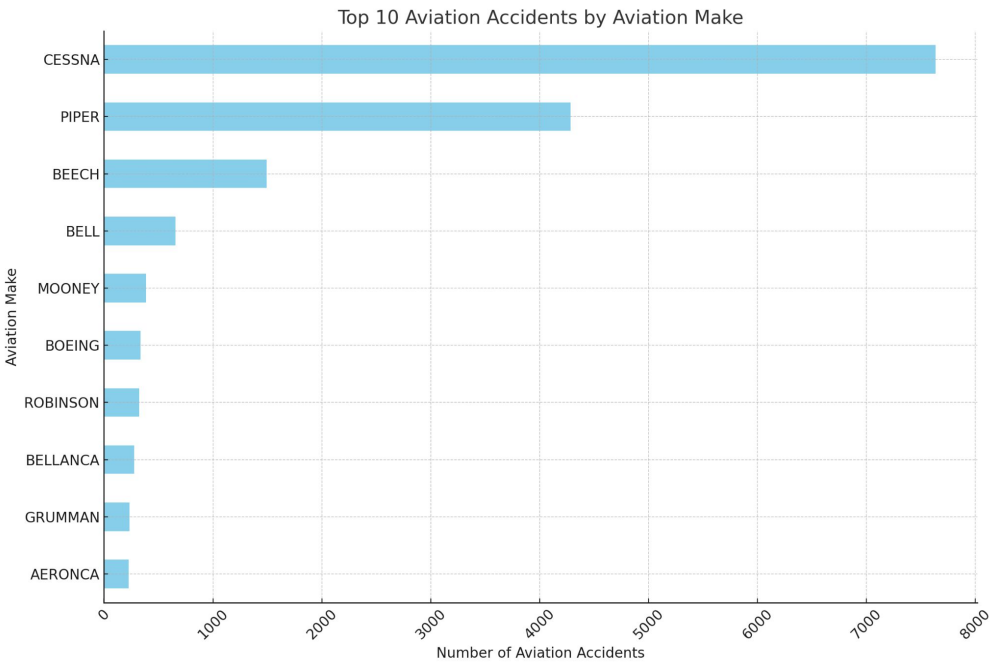
- High-risk purposes include private and air race shows





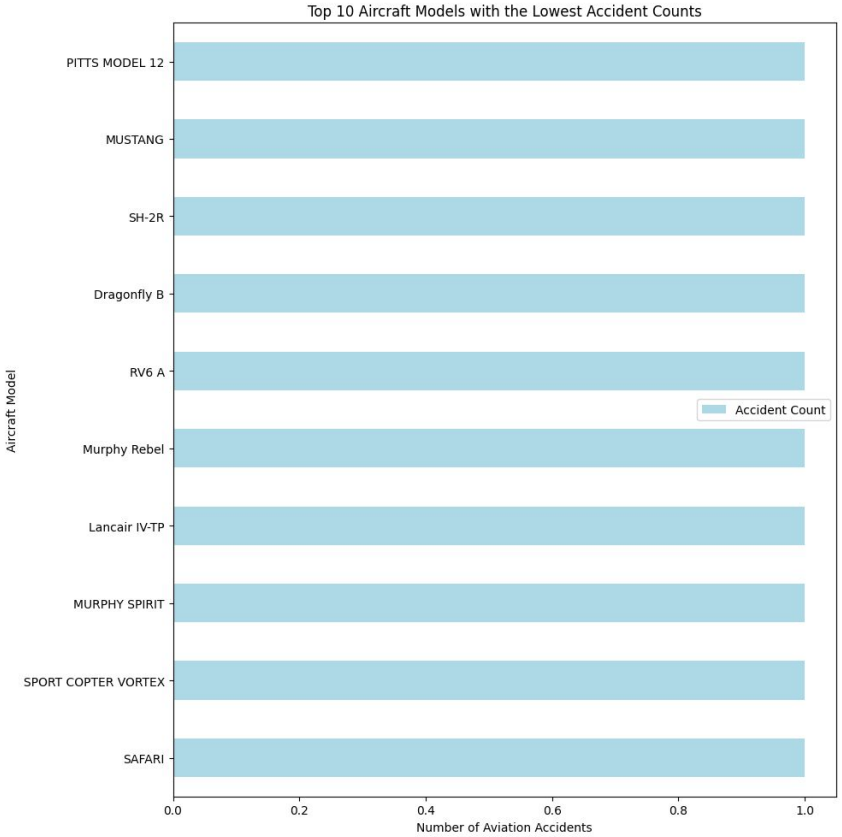
Makes with Highest Accident Counts:

- Cessna
- Piper



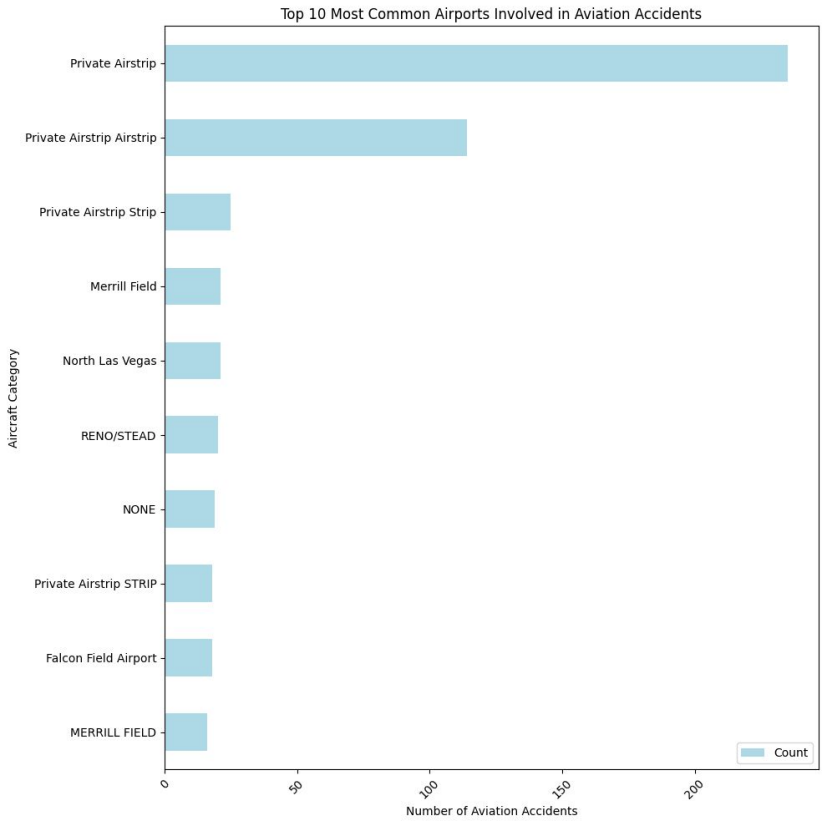
Models with Lowest Accident Counts:

- Pitts Model 12
- Mustang



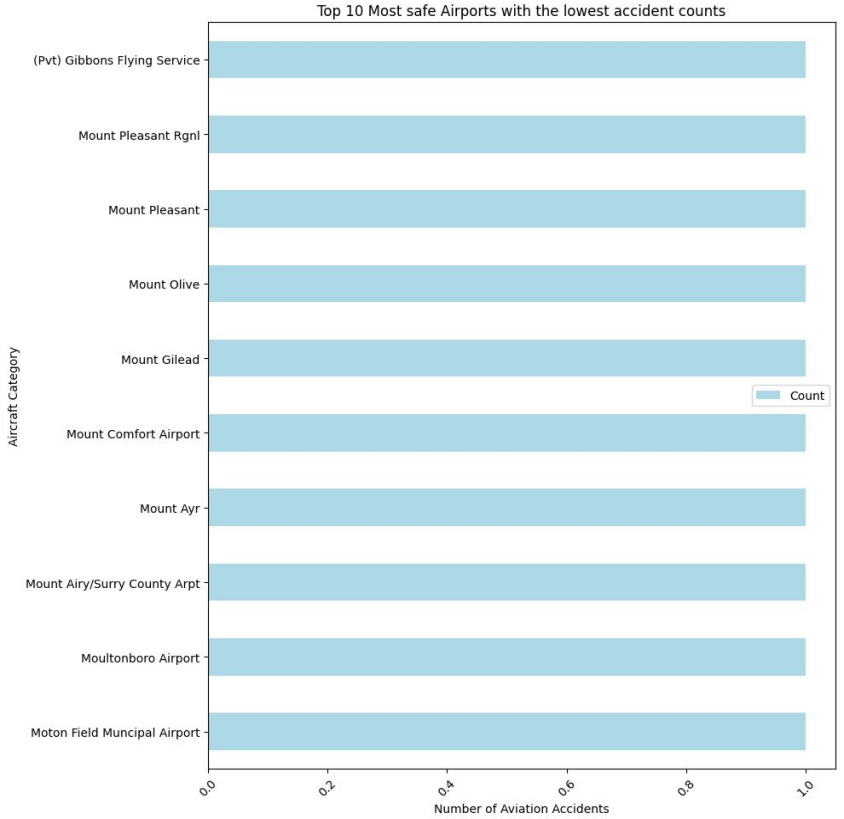
Airports with Highest Risk:

- Small private airstrips have the highest number of accidents



Safest Airports:

- Gibbons Flying services



Conclusions

Recommendations & Business Applications

1. Invest in safer aircraft models and makes:like Pitts Model, Mustang
2. Develop robust risk mitigation plans on the critical phases of flights prone to accidents (landing and taking off).
3. Establish operation from safer commercial airports

Future Improvements:

- Further workflow data analysis like the number of flights per Aviation model/Make , flight distances, workload of the airports to improve the risk prediction
- Incorporate also data on the number of flights attended per airport or airstrip to improve the prediction of safety
- Review the cost of purchase and maintenance
- Conduct market analysis taking into consideration the insights generated.
- Expand analysis to international data for better global insights in case expansion to the international markets is anticipated .

Thank You!

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