

A blue parallelogram and a light green parallelogram are positioned in the top-left corner of the slide. The background features several faint, dark blue diagonal lines.

Aviation Data Analysis

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Research Question

Analyse the aviation dataset to provide viable insights that will guide the business to venture into the aviation industry.





Understanding the Context

The business is looking to expand into the aviation industry and needs to identify aircraft with the lowest risk. We will analyze aviation accident data from the National Transportation Safety Board (NTSB) covering civil aviation accidents and selected incidents in the United States and international waters from 1962 to 2023.

The goal is to provide actionable insights and recommendations to the head of the new aviation division to help them make informed decisions about which aircraft to purchase.

Experimental Design

1. Defining the Question
2. Data Preparation
 - * Reading the Data
 - * Checking the Data
3. Data Cleaning
4. Feature Engineering
5. Performing EDA
6. Summary and Conclusion
7. Data Relevance
8. Recommendation

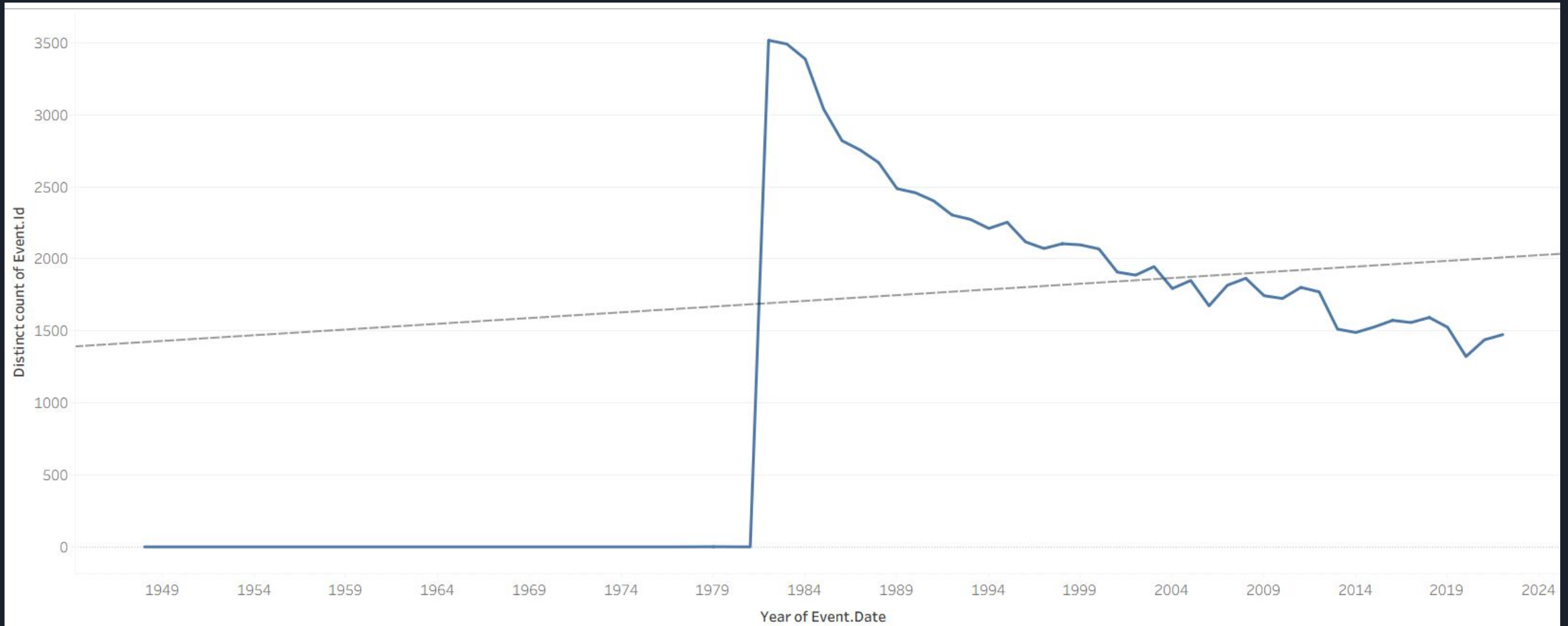


Analysis

A Detailed analysis can be found on the following github repository hosting the data as well as jupyter notebook:

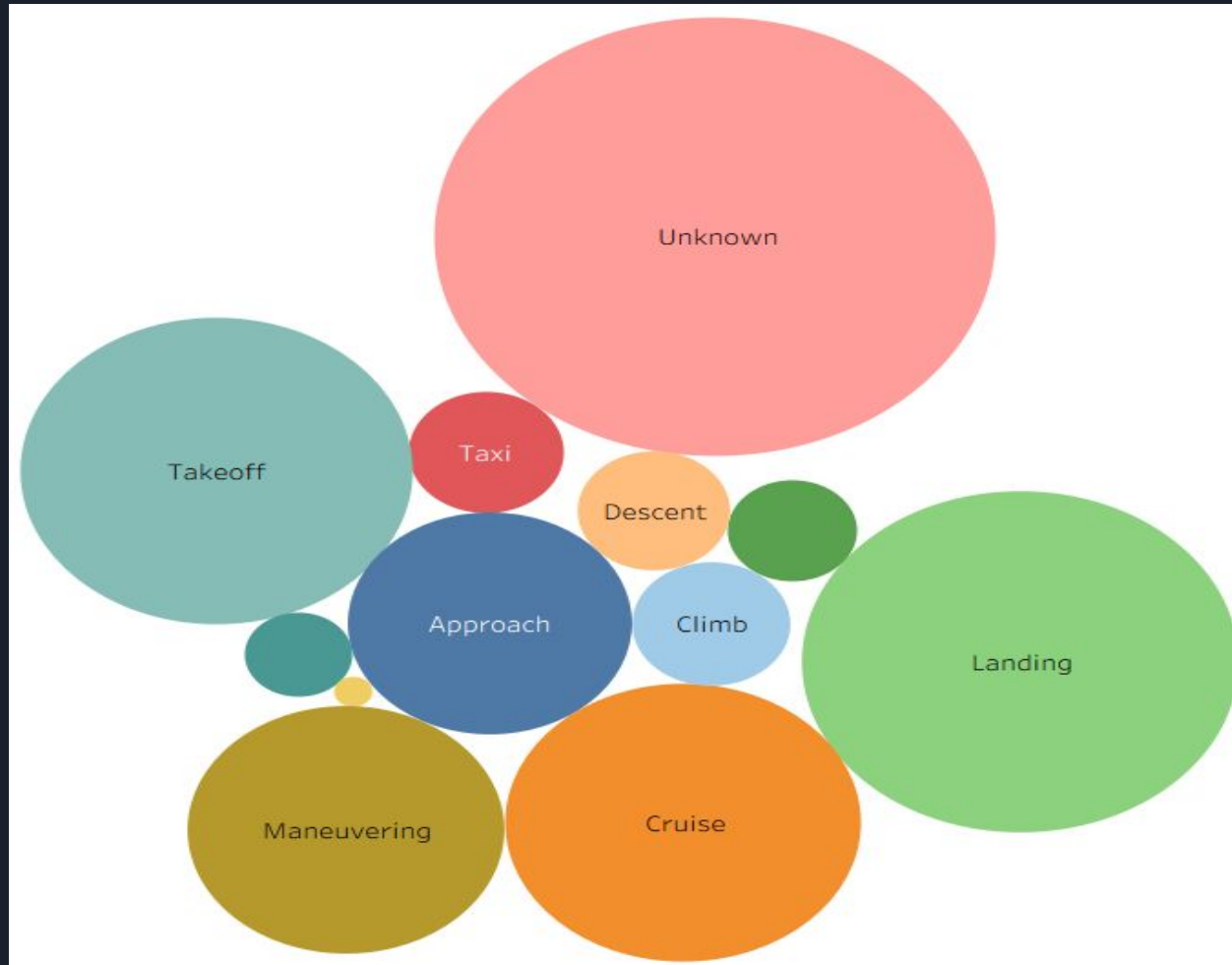
https://github.com/NjorogeWinnie/Aviation_industry_analysis

Aircraft Accidents Over Time



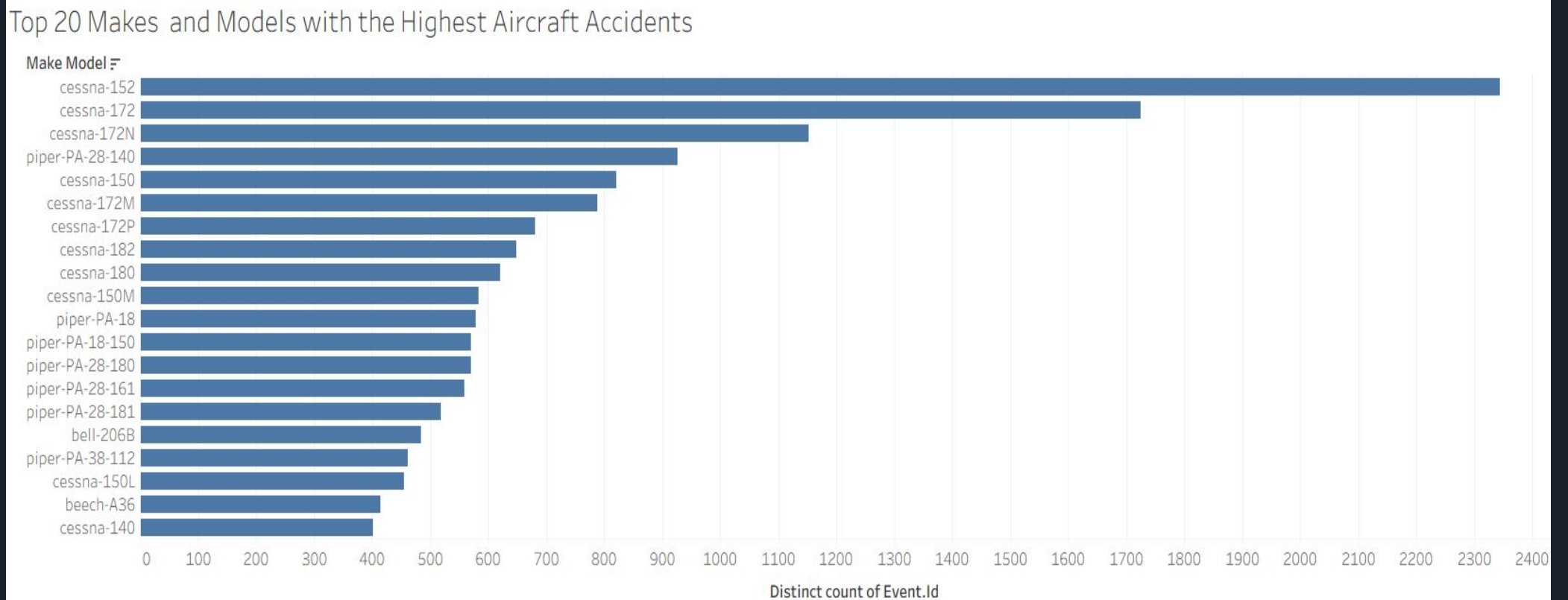
Based on line graph, the accidents report in recent years has decrease as compared to previous years. This could be indicative of improvement in safety of aircrafts in the aviation industry.

Phase of flight during accidents



A significant number of accidents occur during Takeoff and landing phases. This could be indicative of lack of significant pilot training in landing and taking off. We would therefore advise the company to invest in advanced pilot training can greatly reduce risk.

Top 20 Makes and Models with the Highest Aircraft Accidents



We can see that aircrafts like Cessna and Piper have the highest count of reported accidents which could be attributed to their widespread use as they are popular and large aircraft manufacturers in the aviation industry.

Other well known and large manufacturers of aircrafts with high accident rates are Bell, Boeing and Beech.

However, compared to Cessna and Piper, Bell, Boeing and Beech have significantly lower accident rate over the same period of time.

Top 20 Makes and Models with the Lowest Aircraft Accidents

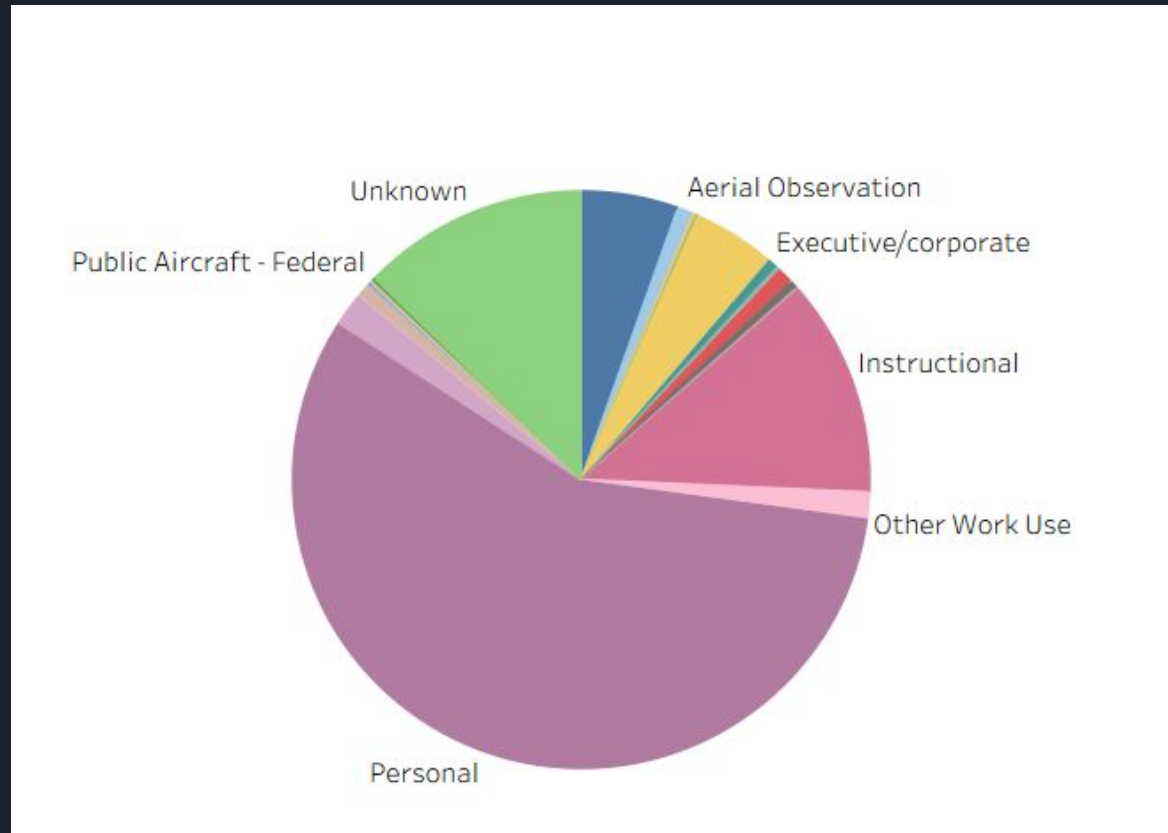
Top 20 Makes and Models with the Lowest Aircraft Accidents



All the makes with the least number of recorded accident in the dataset are comprised of a variety of names which mostly appear to be from less known aircraft manufacturers.

Although these makes have the least reported number of accidents, it may not be indicative of their overall safety, it may merely suggest that these are highly specialized aircrafts built by individuals and not many of them are operational, thereby leading to low reported cases of accidents.

Aircraft Accident by Purpose of Flight



From the piechart above, the flight purpose with the highest risk is flights for personal use. This could be indicative on a lack of proper training in decision making in emergency situations by pilots flying aircrafts for personal purposes. As such, we would recommend for additional pilot training in this areas.

Conclusion

Based purely on the accident counts in this dataset, the aircraft categories with the lowest recorded incidents are: ULTR, Rocket, Powered-Lift, Blimp, WSFT, Ultralight, Powered Parachute, Weight-Shift, Gyrocraft, Balloon.

For this reason, we would advise the company to look at these aircraft categories first as an investment option.

However, it's important to note that while these categories have the fewest accidents in this dataset, this does not definitively mean they are the "lowest risk" without considering operational data such as the number of aircraft in service or total flight hours for each category. However, within the scope of this dataset, they show the least frequent involvement in reported accidents.

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Recommendations

Recommendations for the head of Aviation:

1. Prioritize low-risk aircraft categories.

* Based on accident counts and fatality rates, aircraft such as ultralights, gliders, balloons, and powered parachutes show the lowest recorded accident frequency. These categories are safer entry points for new aviation ventures.

2. Focus on pilot training.

* A significant number of accidents occur during Takeoff and landing phases. Investing in advanced pilot training can greatly reduce risk.

3. Assess flight purpose risks

* Identify purpose of flight with high-risk — such as personal or instructional operations — to focus safety initiatives and training where they'll have the greatest impact. In this case since most aircraft accidents are linked to flying for personal purposes, pilots flying for this purpose could be trained on better decision-making and situational awareness as well as additional training on handling emergency situations.

4. Obtain exposure data.

* This will provide more operational data that would be useful in the analysis and give a clearer understanding of accident rates and hence more accurate risk comparisons.