

An aerial photograph of an airport tarmac. In the center, the rear section of a large white passenger airplane is visible. To the left of the plane, several yellow luggage carts are parked. Further left, a parking lot contains several cars. The tarmac is marked with various ground service equipment and directional signs. The overall scene is a typical airport environment.

GEORGE NYANG'AYA

Opportunities to break
into aviation industry

Project Overview



As part of our 'Vision 2030' campaign, one key strategy for growth is prioritising the diversification of our portfolio across various industries



One industry with great investment potential identified was the aviation industry

Key focus: commercial and private flight



I have used data analysis techniques to assess the risks associated with various aircrafts to help aid decision making on the safest option to buy

Dataset overview



Description

- The data being used from the National Transportation Safety Board
- It includes data about civil aviation accidents and selected incidents in the United States and international waters
- It provides aviation accident data from 1962 – 2023



Key data includes

- **Make and Model** of aircraft
- **Extent Aircraft damage**
- **The Purpose of flight**
- **The broad phase of flight** the incident occurred
- The date of the incident



Shape

- A total of 31 columns
- 88,889 incident records

Limitations of the data

- Only have data regarding aircraft that had an incident. Ideally, I would've had access to non-incident flight data to compare it against.
- Did not have access to data descriptions so had to make educated assumptions about what the data represented.
- The dataset had very several columns with thousands of missing values which can harm the integrity of the analysis.
- Several columns of categorical data were severely impaired by spelling mistakes and different variations of the same category.

Data cleaning

01

Due to the limitations of the data, before analysis a data cleaning process was carried out

02

This included identifying and editing extraneous/erroneous values

03

Imputing values in rows that had missing data

04

Creating a new column called 'Flight.category' stemming from the the 'Purpose.of.flight' column to perform more targeted analysis

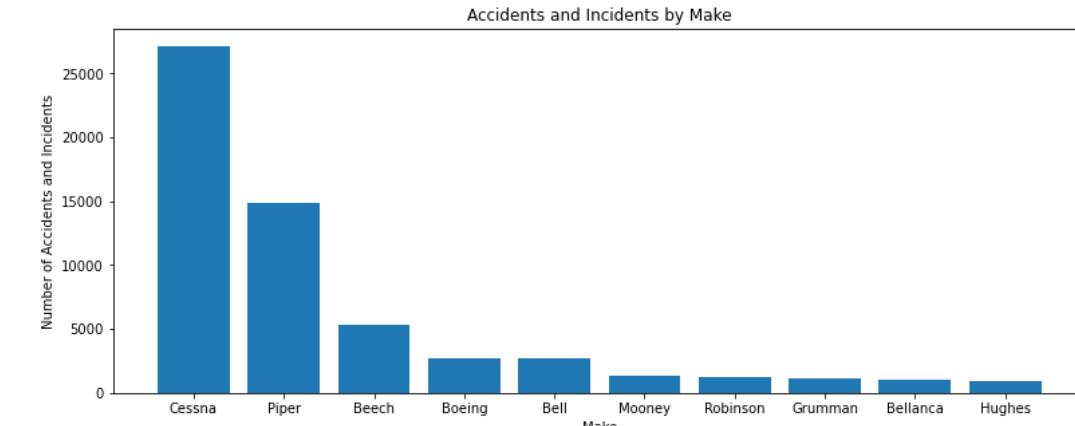
DATA ANALYSIS



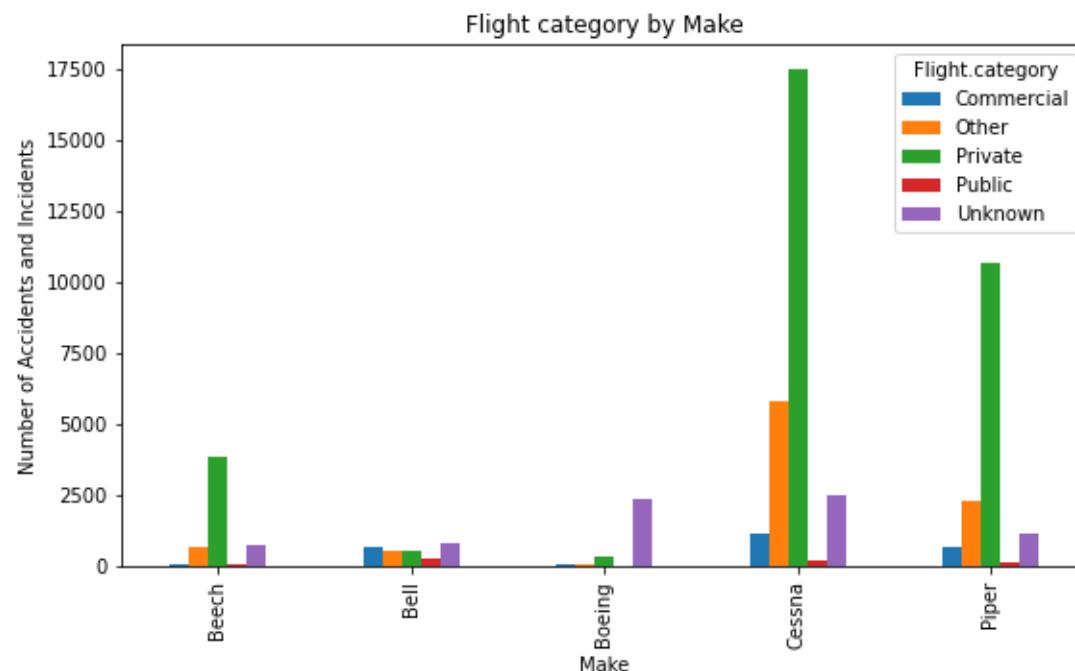
Popularity of make

One of the first bits of analysis conducted was find how frequently each make appeared in the incident data.

- Since we only have incident data, it would be wrong to blindly claim that makes with a frequency of incidents are more at risk. Rather, their high frequency likely indicates the **frequency/popularity** of their use. This could be due to affordability, safety or suitability among other reasons.
- This breakdown found that **30.5%** of incidents were **Cessna's**, followed by **Piper's** at **16.7%**.



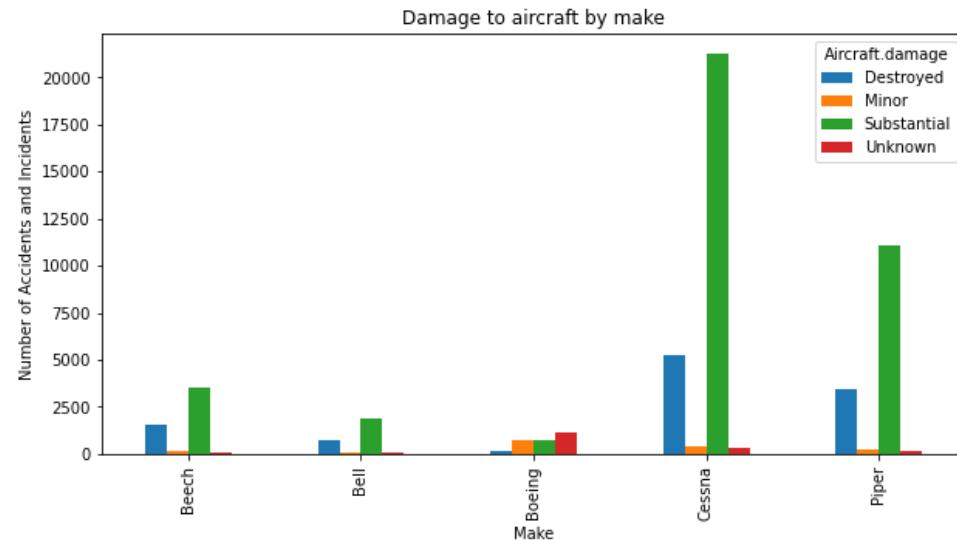
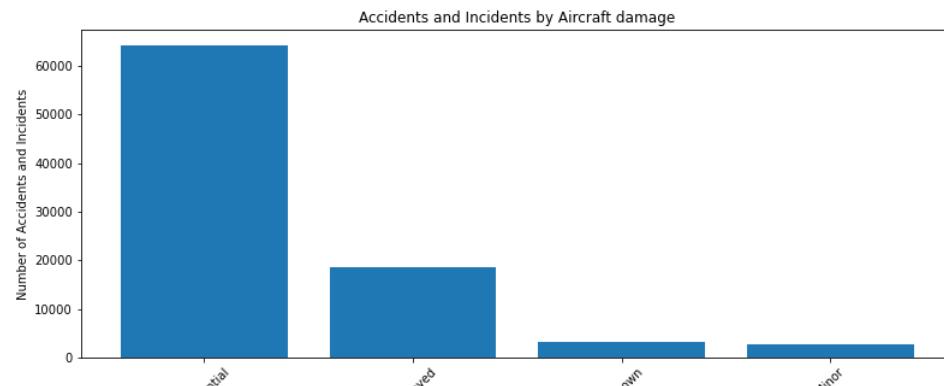
- As the focus is on obtaining flights for private and commercial use, this data was then grouped by the flight category column.
 - Note – analysis was done only using the top 5 most common makes
 - Amongst **commercial** flights, **Cessna's** were the most common make of aircraft at **44.8%** followed by **Piper's** at **26.0%**
 - Amongst **private** flights, **Cessna's** was still the most common at **53.3%** followed by **Piper's** at **32.49%**



Severity of damage by make

The next key bit of analysis done was finding out how severe the damage of the incidents were and comparing each make of aircraft.

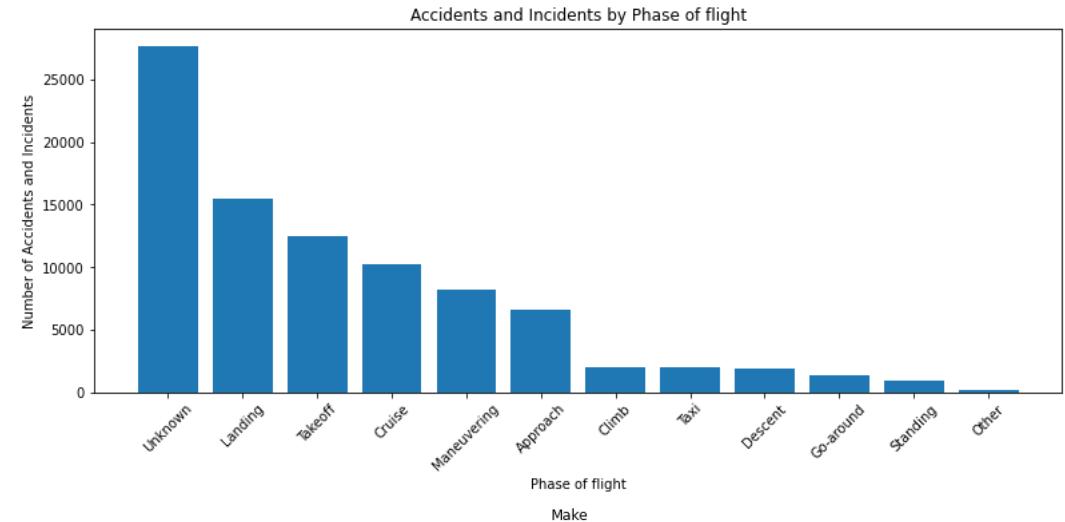
- We see overall **72%** of flights face **substantial** damage, **21%** are **destroyed** and **3%** only take **minor** damage.
- When comparing the top 5 most common aircraft makes, we see 4 out of the 5 follow a similar trend. As the graph demonstrates, the **exception is Boeing aircraft**, but this can be attributed to the data being warped by **41%** of values being '**Unknown**'.
- It can also be noted out of the other four makes, **Cessna's** have the **lowest rate of aircraft being destroyed** at **19%**, suggesting their incidents are salvageable more often.



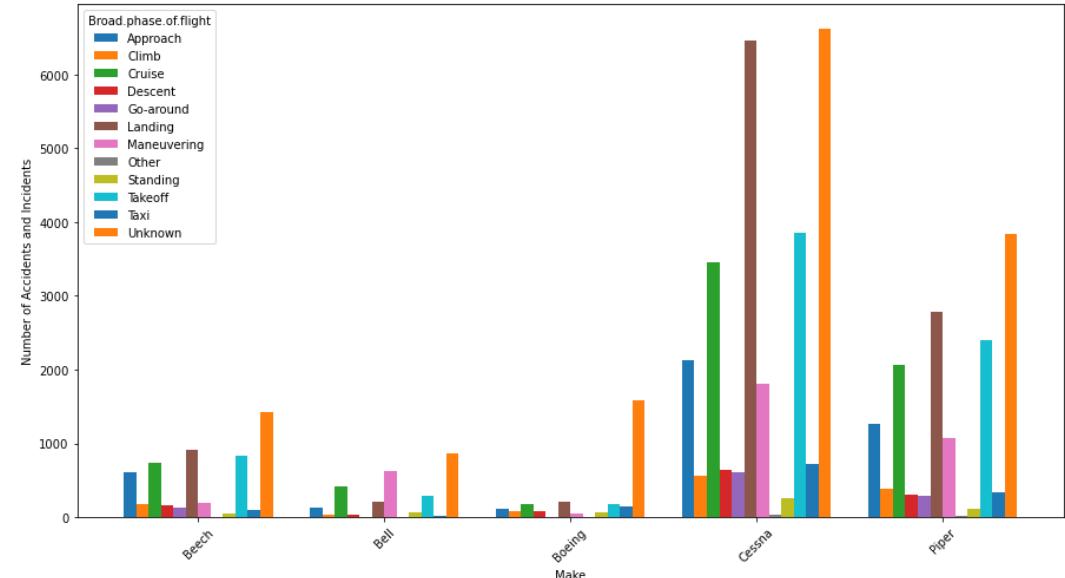
Phase of flight incident occurrence by make

The final key bit of analysis to perform was to assess at which phase of the flight each make was facing an incident. This is because it can help ascertain whether the incidents were systematic issues with the make, human error or freak accidents .

- The most common time for an incident to occur is during landing and take off as these are the most complex phases. During more simple phases such as taxi and standing incidents should be less likely.



- The graph suggest that across the five most common makes, this trend remains fairly consistent with the more complex phases seeing more incidents. The one exception would be Bell aircraft where most incidents occur when maneuvering.
- This might suggest a systemic issue with Bell aircraft as there is a high level of incidents in a phase that should largely be influenced by pilot error



Recommendations

- At this phase, the data has suggested that the private and commercial flight market tends to opt in favour of using Cessna's as its main form aircraft. Relying on the expertise of past of industry standards suggests this could be a low risk aircraft to buy.
- Building on from this, in events where incidents take place, Cessna's have proved to be the most likely aircraft to be left salvageable.
- Finally, the only aircraft that seems at high risk due to systemic issues is the Bell aircraft.
- Therefore, I would suggest purchasing a Cessna to kick-off this new division.

Next steps

- Ideally, further analysis would be performed with a more robust dataset addressing the data limitations mentioned earlier (e.g. non-incident data).
- Market research to analyse the financial side of purchasing and operating various forms of flight. Allowing for a robust cost-benefit analysis.

Thank You

FEEL FREE TO ASK ANY QUESTIONS

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