



AIRCRAFT ANALYSIS

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OVERVIEW OF THE TASK

- The company wants to purchase and operate airplanes for commercial and private enterprises
- Preferably low-risk aircraft

THE DATA

- The dataset holds 31 columns and 90,348 rows
- What we can know: accident severity per aircraft
- What we can't: how prone to accidents the aircraft are (accident rate)
- Why we can't: total exposure time is not provided

HOW I HANDLED THE DATA

- EDA
- Clean – case, null values etc
- Aggregate - sum, mean etc
- Create and merge new dfs
- Filter and sort values by relevant criteria
- Create visualizations

HOW I HANDLED THE DATA

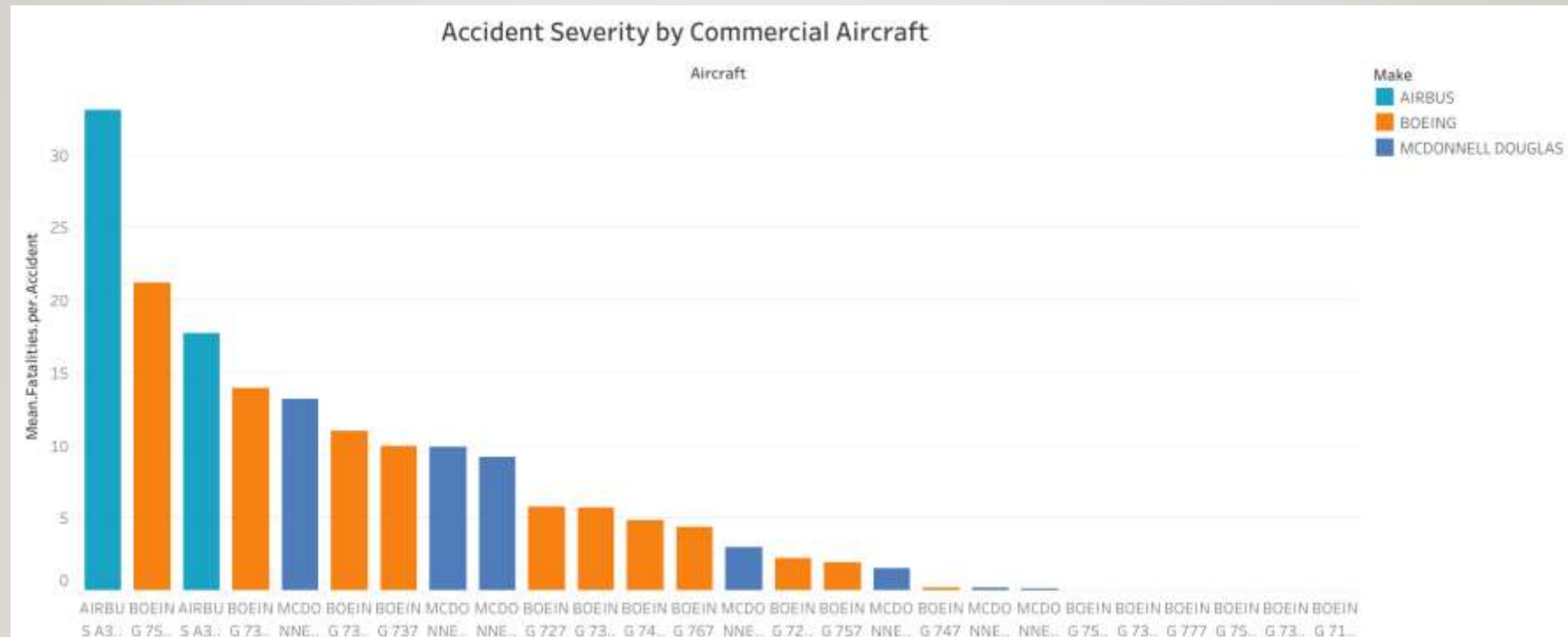
- Given that total exposure time/flight hours is not declared, we cannot define low-risk aircraft in terms of accident rate
- Given this constraint, I've opted to employ accident severity as the metric for risk
- Defining accident severity as the mean fatalities per accident
- While filtering for the number of accidents, to ensure the findings are not a fluke

VISUALIZATIONS

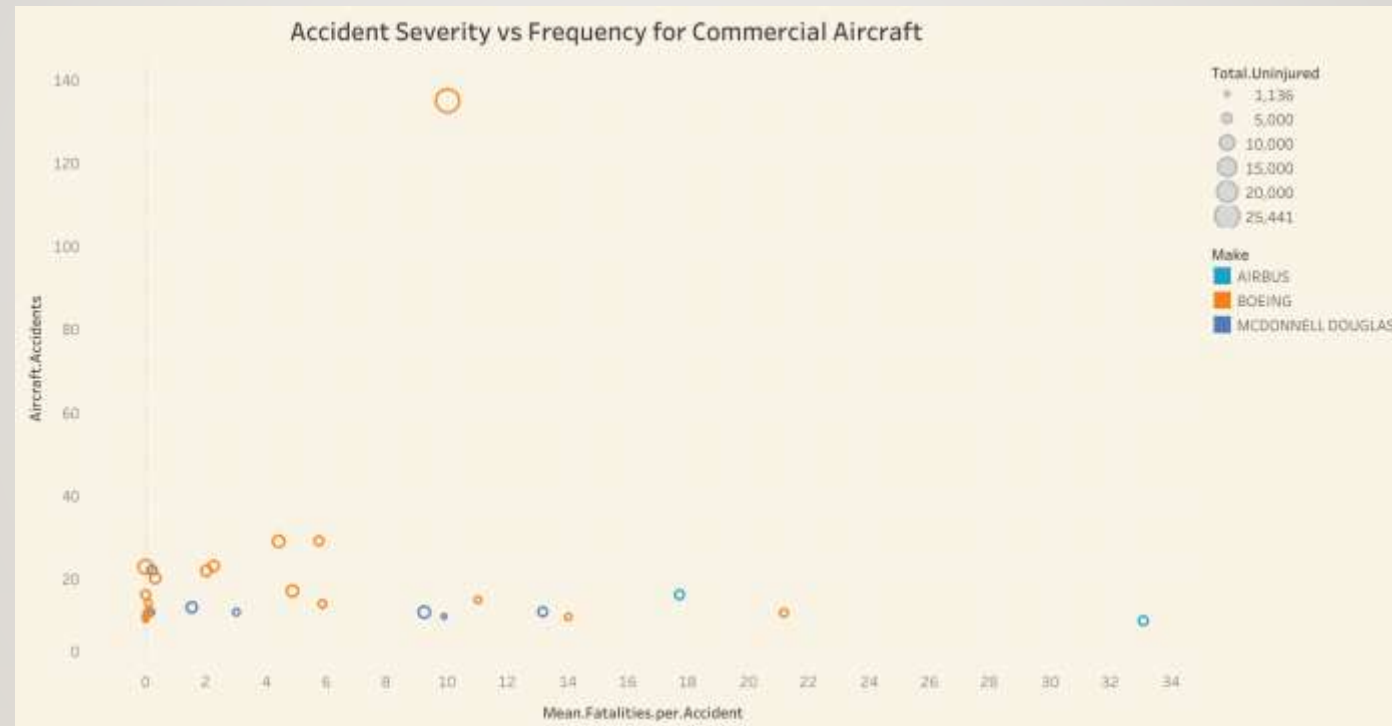
- **Accident Severity by Commercial Aircraft**
- **Accident Severity vs Frequency for Commercial Aircraft**
- **Yearly Trend of Total Fatalities by Commercial Aircraft**

- **Accident Severity vs Frequency for Private Aircraft**
- **Private Aircraft with Minimum Severity across ≥ 20 Accidents**

COMMERCIAL

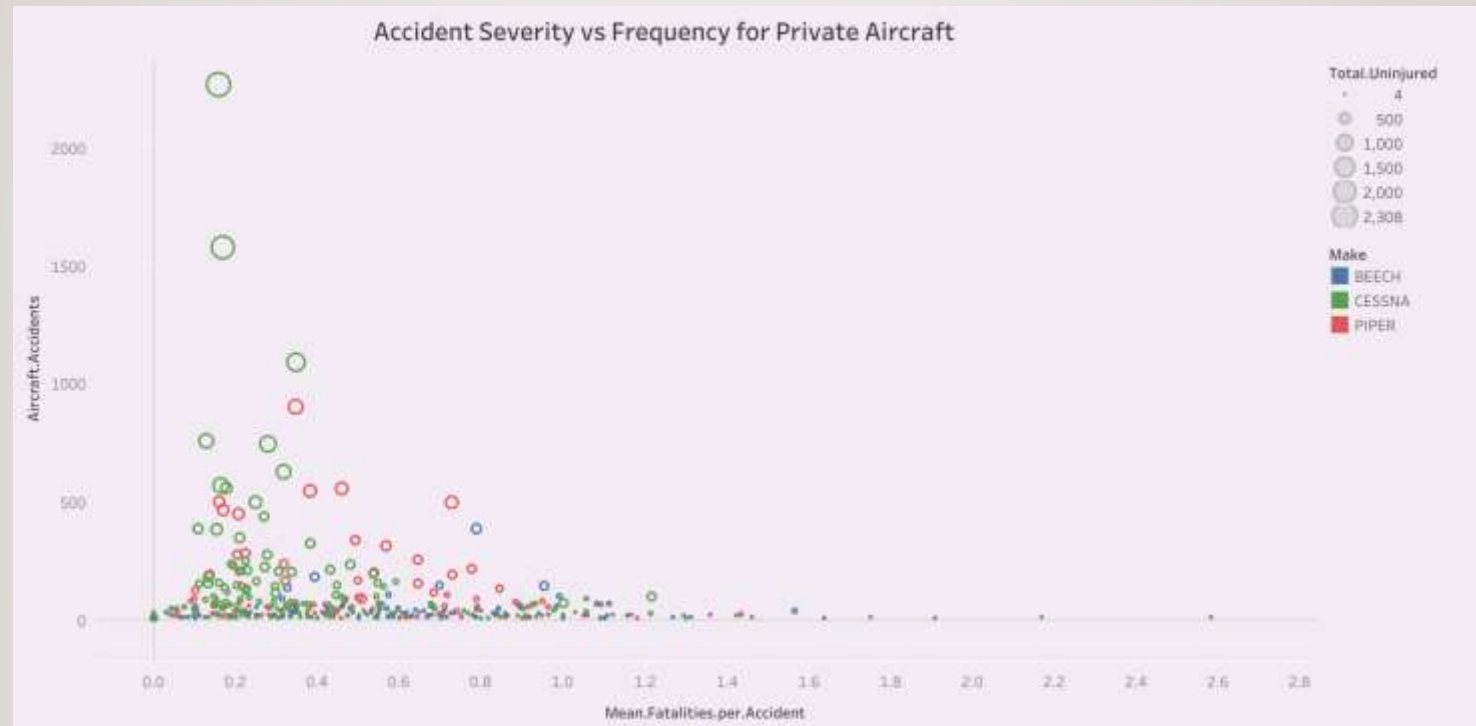


COMMERCIAL



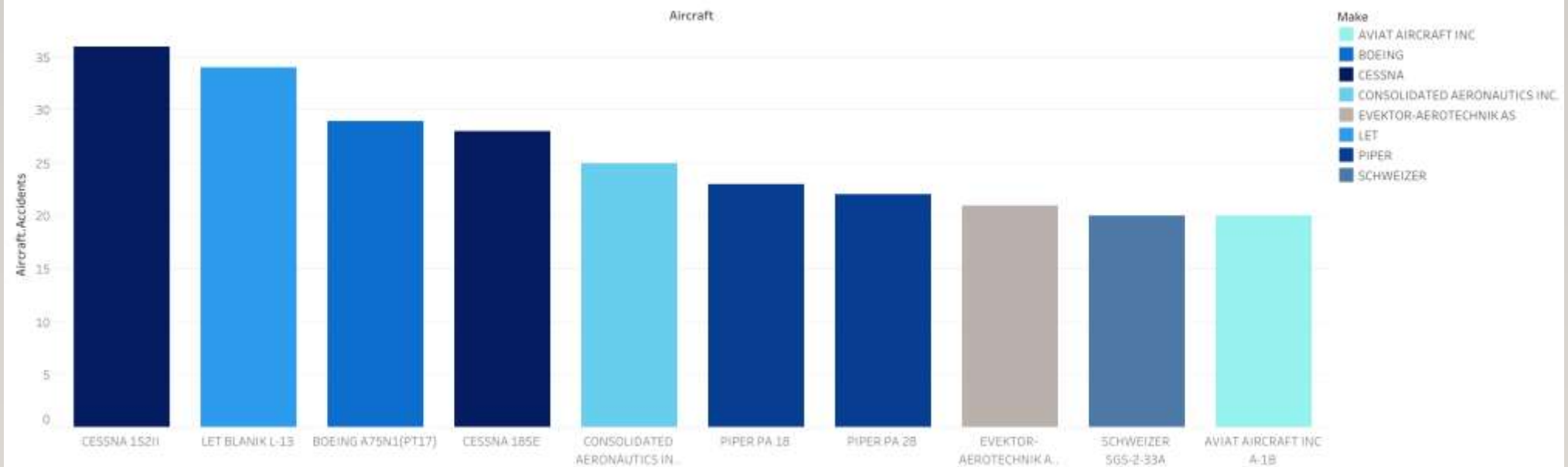


PRIVATE



PRIVATE

Private Aircraft with Minimum Severity across ≥ 20 Accidents



FINDINGS: COMMERCIAL AIRCRAFT

- Of the 26 commercially relevant aircraft with substantial accident history($10 \geq$), the BOEING 777 exhibits the strongest safety performance in terms of accident severity
- The BOEING 777 has the highest accident count(23) among commercial aircraft with zero fatalities
- the top 5 safety performers, in terms of accident severity, are all BOEING aircraft

FINDINGS: COMMERCIAL AIRCRAFT

- The **BOEING 737** is the **outlier** in this dataset, both in sheer number of total fatalities and the fact it's fatalities have been on the rise in recent years
- the BOEING 737 also has several times more accidents(135) than the rest
- Perhaps it has more recorded flight hours than the rest. It could be an exposure bias, or it might be more prone to accidents
- From 1985 – 2008 it had 0 fatalities. Since 2008 there's been a spike, with fatalities reaching 249 in 2010, 301 in 2018 and 132 in 2022.
- In any case, it underscores the fact that safety depends more on severity of accidents, not frequency, particularly when it comes to commercial-capacity aircraft

RECOMMENDATIONS: COMMERCIAL AIRCRAFT

- **Prioritize the BOEING models, specifically the 777**
- **Treat high accident frequency as an operations issue, not just an airframe issue**
- **Nonetheless, exercise additional due diligence eg. machine and training requirements (to minimize crashes)**
- **Seek total exposure time data for each aircraft**

FINDINGS: PRIVATE AIRCRAFT

- 694 private planes with a minimum accident count(10)
- Of the 694, cessna, piper and beech are the most frequently occurring Make's (416 collectively)
- 45 had zero fatalities
- Of the 45, cessna and piper account for 15 combined.They are the Make's with the lowest accident severity

FINDINGS: PRIVATE AIRCRAFT

- After ranking the 45 based on accident count, the CESSNA 152II exhibits the strongest safety performance in terms of accident severity
- It has the highest accident count with zero fatalities (36)
- 2 of the top 5 among the 45 are CESSNA

FINDINGS: PRIVATE AIRCRAFT

- CESSNA 152 is very much an outlier in terms of accident count, but still scores low on accident severity
- It has the highest accident count(2270), with a mean fatalities per accident of 0.158
- could be exposure bias, or is more prone to accidents

RECOMMENDATIONS: PRIVATE AIRCRAFT

- **Prioritize the CESSNA and PIPER models, specifically the CESSNA 152II**
- **Match aircraft safety performance to pilot experience**
- **Budget for repairs as the frequency of accidents is much higher than commercial aircraft**
- **Seek total exposure time data for each aircraft**

QUESTIONS?

- I'll happily take your questions now