

Evaluation of Aircraft Safety for Commercial and Private Enterprises

Presenter: *Setare Hajarolasvadi*

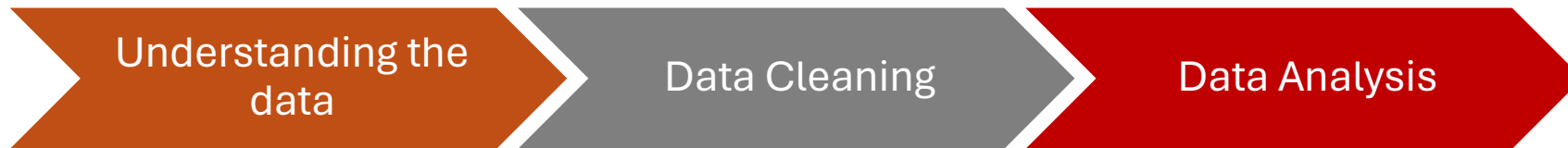
DS Flex Program: *Phase I Project*

Overview

- Objective
- Dataset
- Data Cleaning
- Data Analysis
- Results
- Recommendations
- Limitations

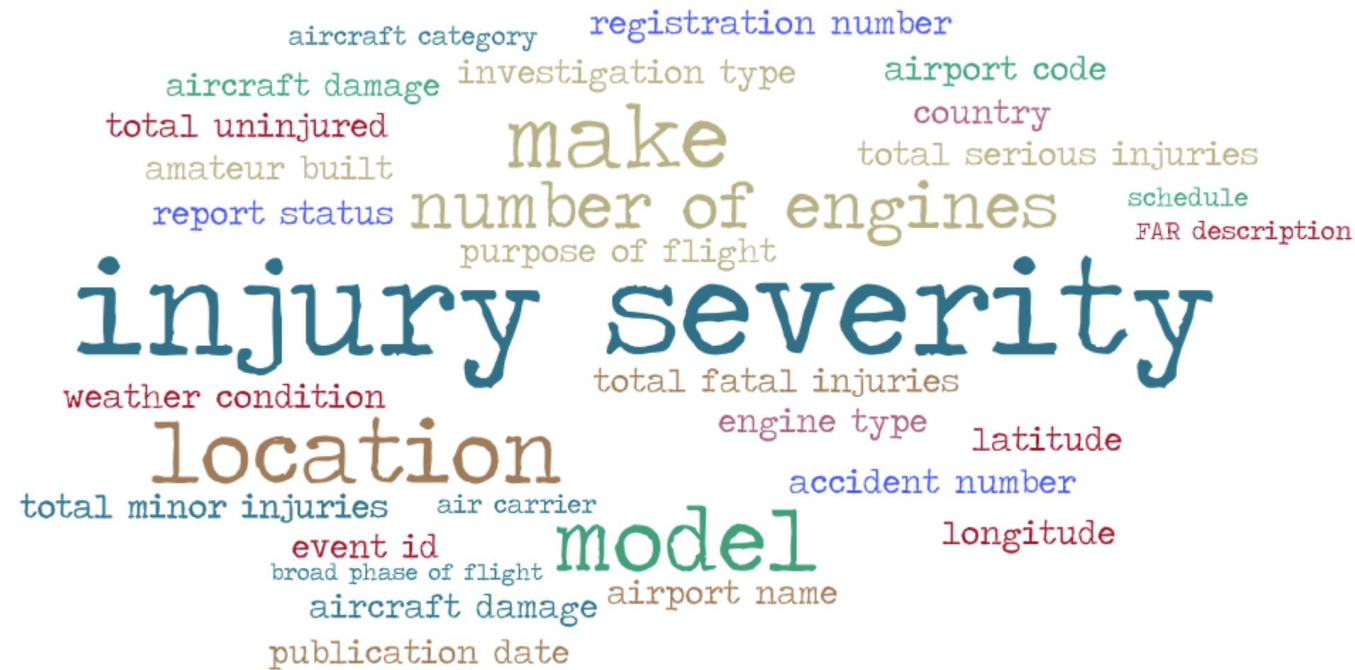
Objective

- Evaluate the potential risks of aircrafts and make recommendations for stakeholders interested in purchasing and operating airplanes for commercial and private enterprises.



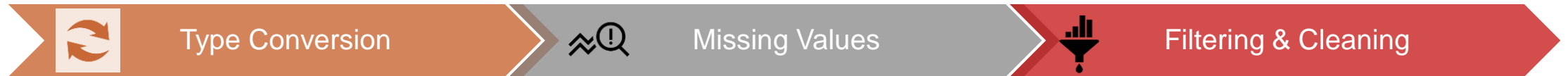
Dataset

- The [aviation accident dataset on Kaggle](#); period: 1948 – present
- # of entries: 90,348; # of attributes: 31.



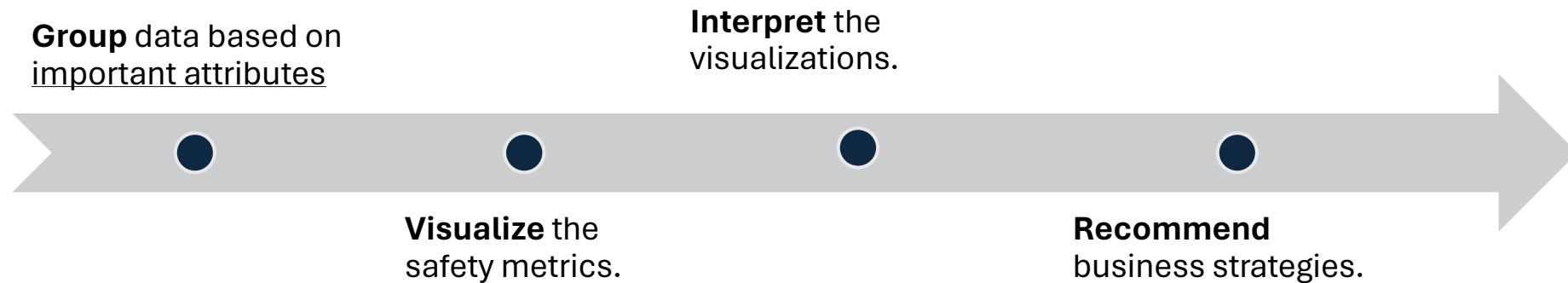
Word cloud showing attributes of the data with the most important ones enlarged.

Data Cleaning



- | | | |
|---|---|---|
| <ul style="list-style-type: none">• Event date: object → datetime | <ul style="list-style-type: none">• UNK, Unk, Unknown → NaN• NaN > 30% → drop column• Remaining Rows with NaN → drop rows <p>64% of entries retained.</p> | <ul style="list-style-type: none">• Country: United States• Location: state abbreviation• Unify capitalization. |
|---|---|---|

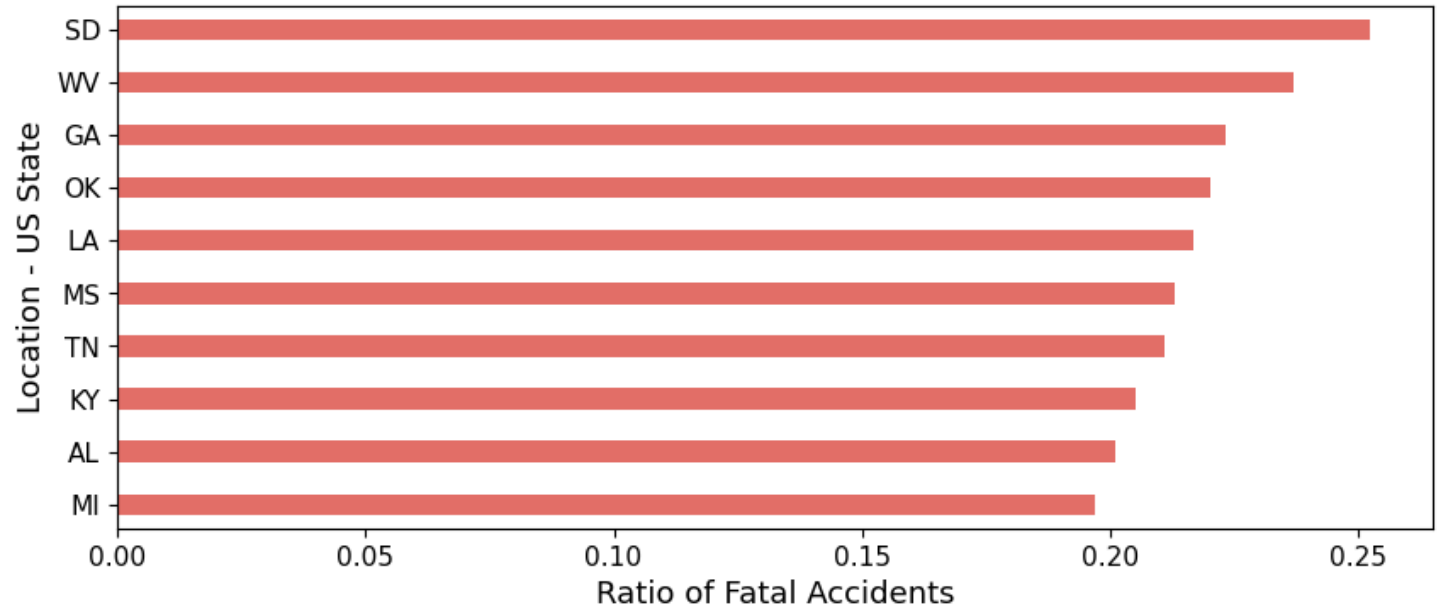
Data Analysis



safety evaluation metric:

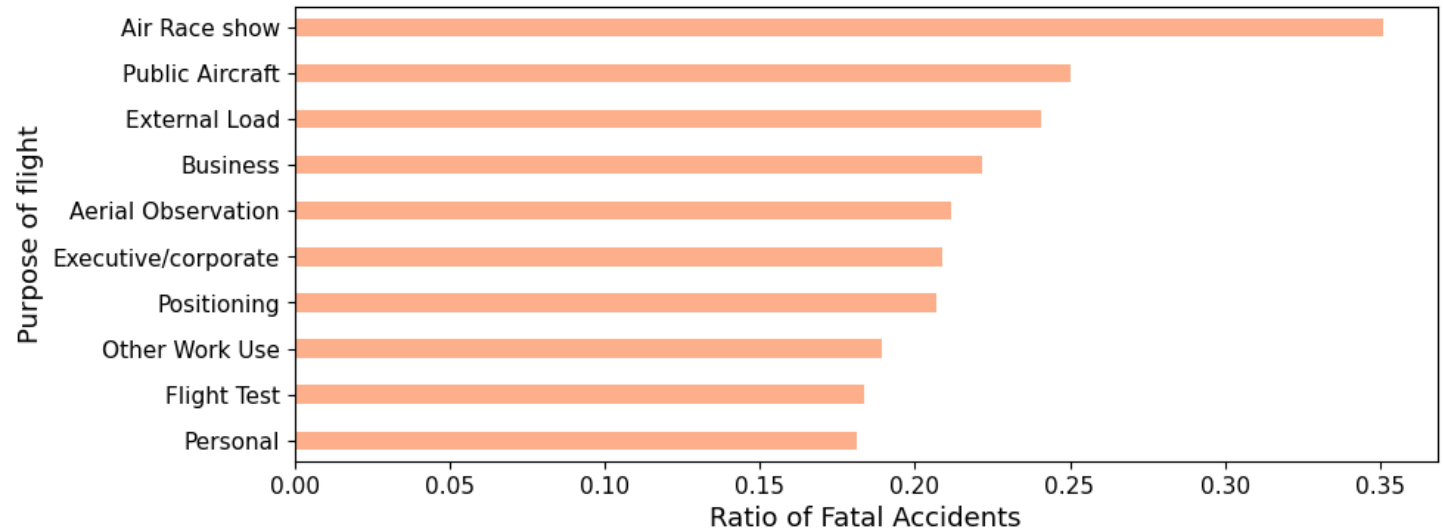
- Total number of fatal accidents – Normalized

Results: Location

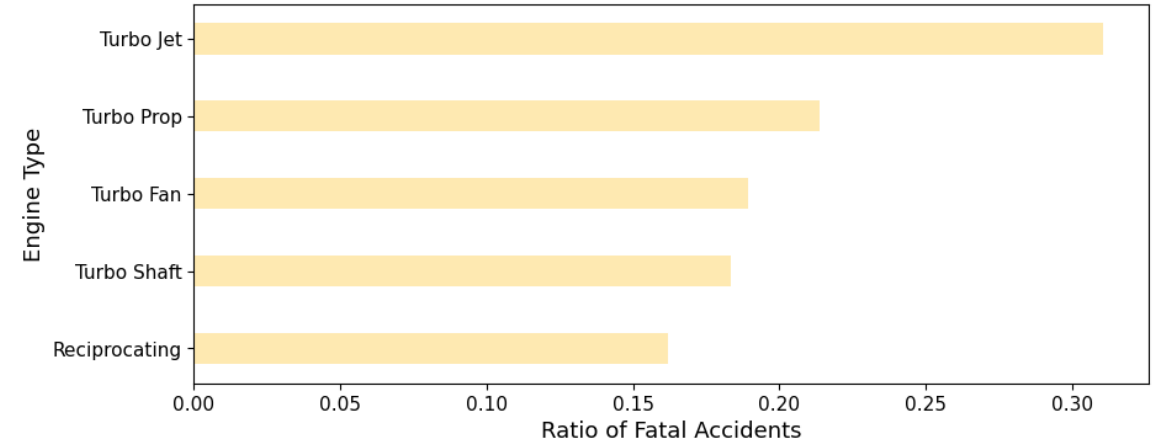
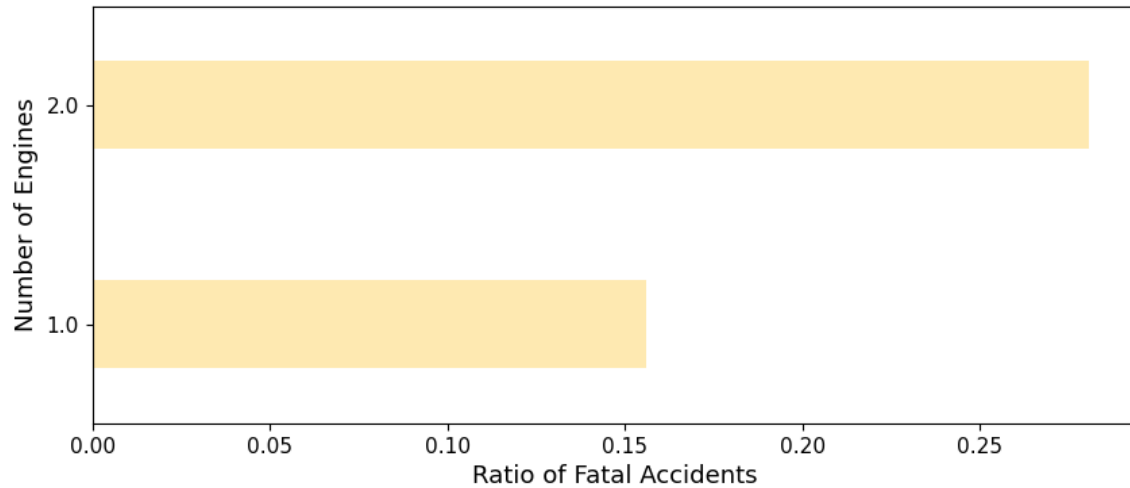


Key Takeaway(s): South Dakota, West Virginia, and Georgia have the highest ratio of fatal accidents among all states.

Results: Purpose of Flight



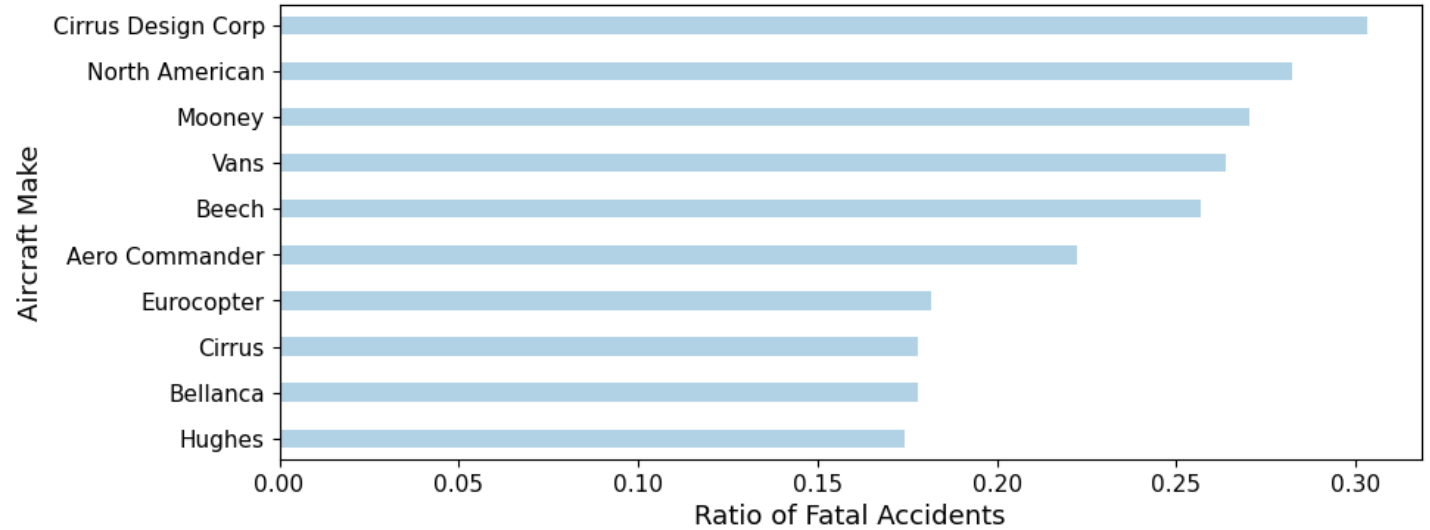
Key Takeaway(s): Aircrafts used in Air Race Shows, Public Aircrafts (used for government functions) and External Load aircrafts have the highest fatality rate.



Results: Effect of Engine Type

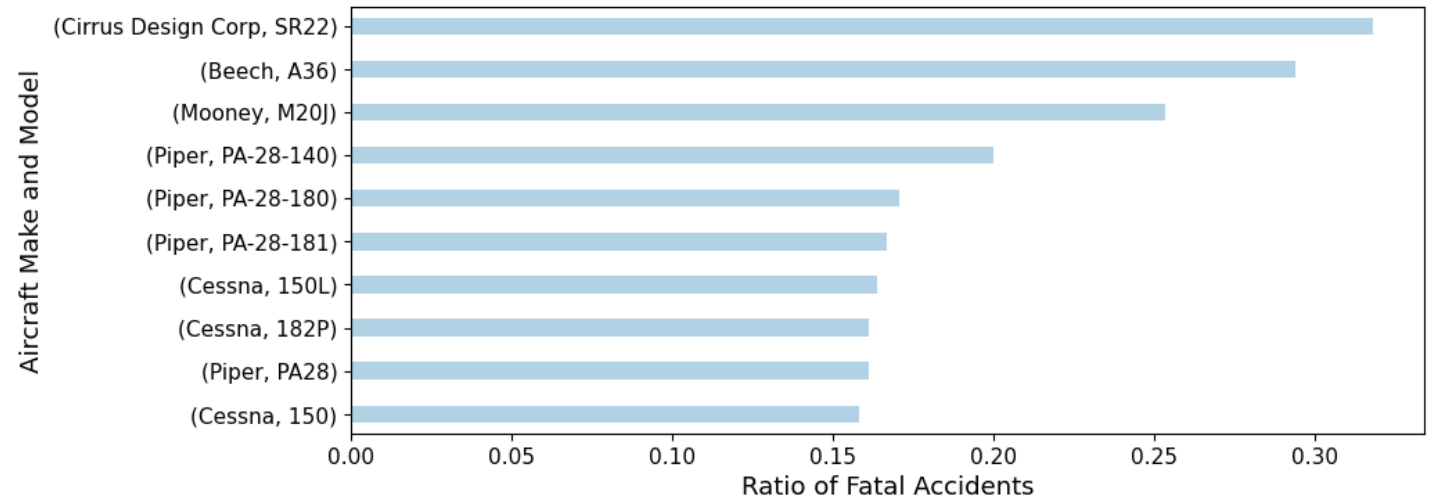
Key Takeaway(s): Double-engine aircrafts and aircrafts using a turbo jet engine are associated with the highest ratio of fatal accidents.

Results: Aircraft's Make



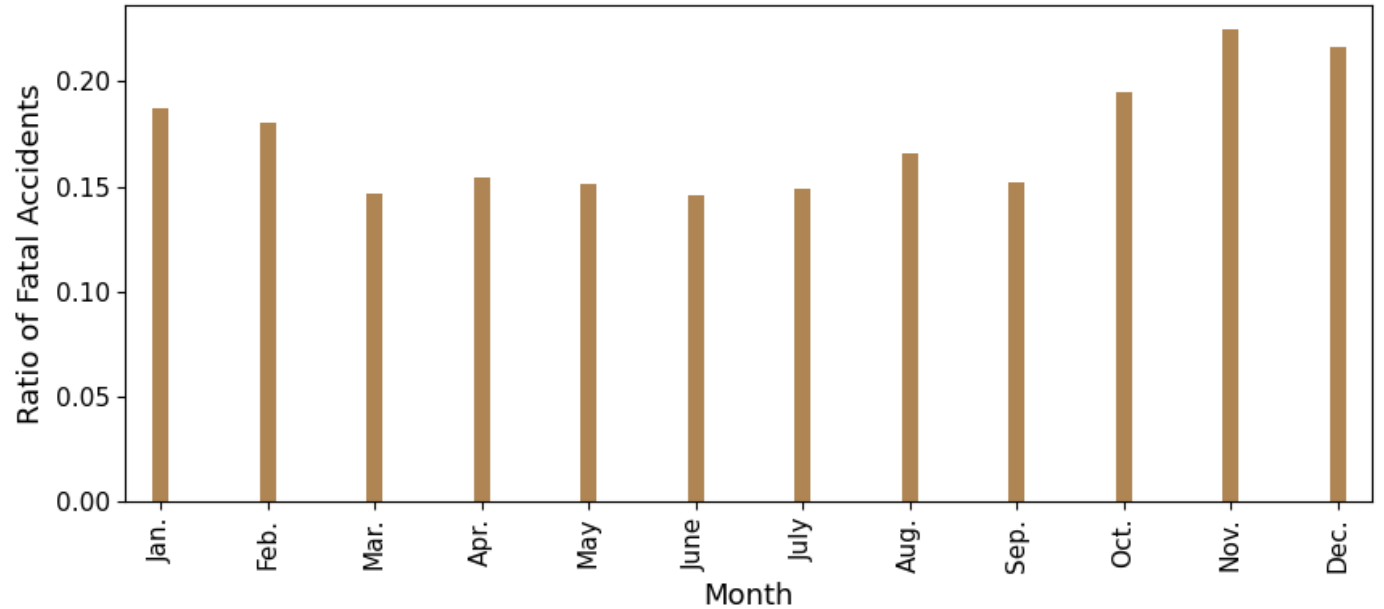
Key Takeaway(s): Cirrus Design Corp, North American and Mooney are the top aircraft makes associated with the highest ratio of fatal accidents.

Results: Aircraft's Make & Model



Key Takeaway(s): Cirrus Design Corp, SR22, Beech, A36 and Mooney, M20J have the worst performance.

Results: Time of Year



Key Takeaway(s): The ratio of fatal accidents is highest during winter, when the weather conditions are least optimal.

Recommendations

- **Do not pursue** business in *South Dakota, West Virginia, and Georgia*.
- **Do not pursue** business in areas where aircrafts are usually used for *Air Race Shows, as Public Aircrafts and External Load aircrafts*.
- **Exercise caution** when investing in aircrafts with *single/dual engines and turbo jet engines*.
- **Avoid** purchasing from the following manufacturers: *Cirrus Design Corp, North American and Mooney*.
- More specifically, **avoid** *Cirrus Design Corp-SR22, Beech-A36 and Mooney-M20J* with the worst performance.
- **Have contingency plans** in place and increases regular inspection *from late fall through the whole winter season*.

Limitations

The above study is limited in the following ways:

1. The analysis is limited to the United States.
2. Total number of flights per grouping of each feature not available.