PROJECT

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INTRODUCTION

Aviation Risk Analysis for Company X

Determining the Lowest Risk Aircraft for Commercial and Private Use

BUSINESS CONTEXT

Company X is expanding in to new industries to diversify its portfolio. They are particularly interested in purchasing and operating airplanes for commercial and private enterprises. However, they do not have enough knowledge on the potential risks of aircrafts.

DATA

The data is from the National Transportation Safety Board that includes aviation accident data from 1962 to 2023 about civil aviation accidents and selected incidents in the United States and international waters. The dataset was obtained from Kaggle.

DATA OVERVIEW

The data set contains :

- 88889 rows and 31 columns
- Key Attributes selected:

1. Investigation Type
2. Event Date
3. Injury Severit
4. Aircraft Damage,
5. Number of Engines,
6. Engine Type
7. Flight Purpose
8. Fatal Injuries
9. Weather Condition
10. Make
11. Model.

PROCESS STEPS

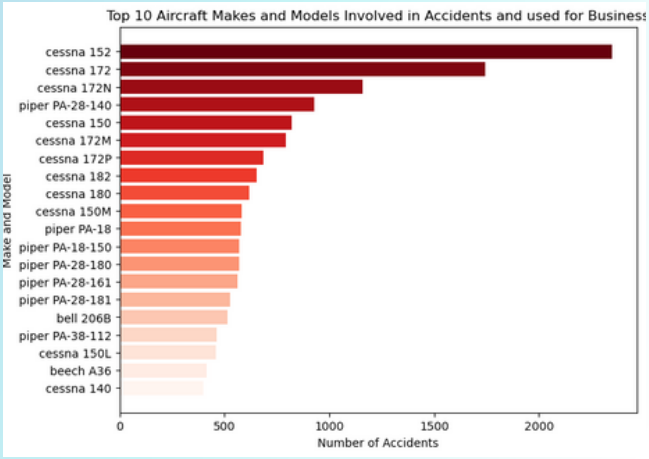
- DATA CLEANING
- EXPLORATORY DATA ANALYSIS

DATA CLEANING

- Renamed the columns to better names. e.g Purpose.of.flight to Flight_Purpose.
- Dropped irrelevant columns.
- Handled missing values.
- Standardized text (e.g., converting 'Make' to lowercase).
- Filtered out unknown and null values in all columns bit by bit

EXPLORATORY DATA ANALYSIS

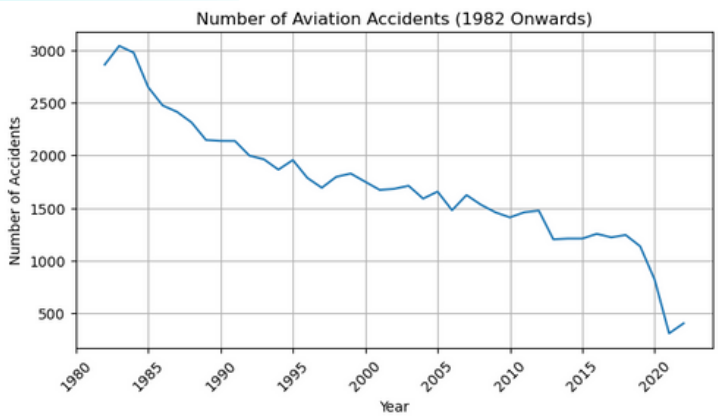
- **Analyzed accident frequency by 'Make' and 'Model'.**



We can see that

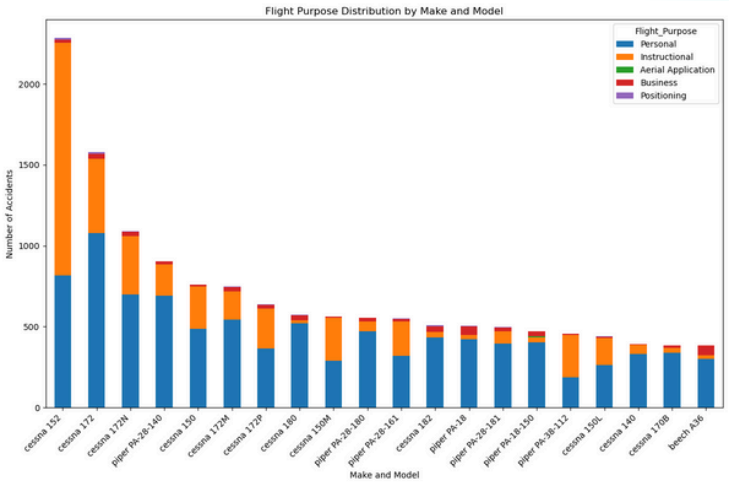
- Cessna had been involved in many accidents, followed by PIPER.
- Cessna Model 152 has most accidents.

- **Distribution of accidents yearly**



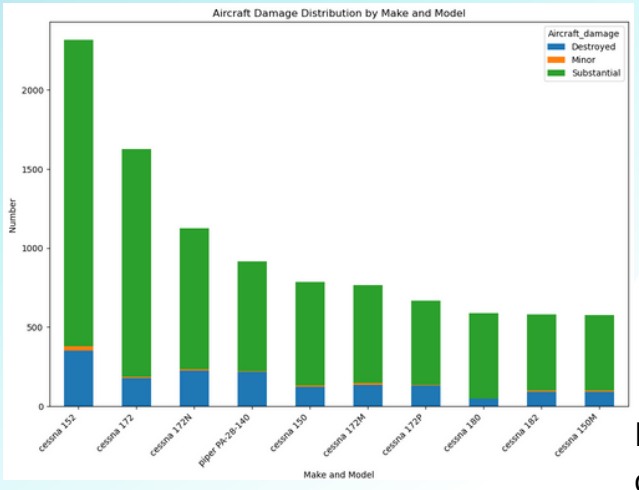
There's a dramatic decrease of accidents across the years.

- **Investigated flight purposes associated with accidents.**



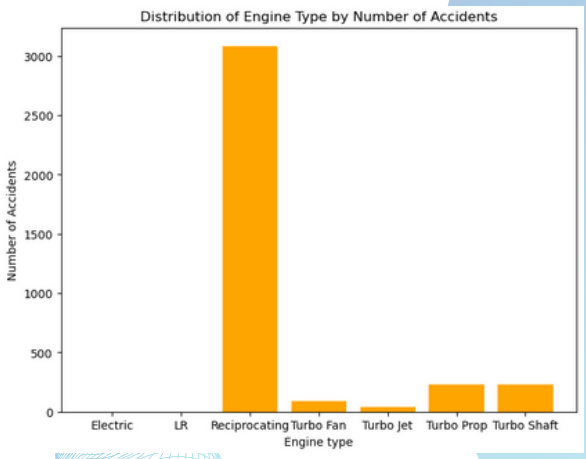
From the distribution, CESSNA and PIPER have been involved in most accidents while Personal and Instructional use lead the flight purpose.

- **Examined aircraft damage types.**



Most Aircrafts suffered Substantial damage.
CESSNA leads and the various models

- **Evaluated engine types related to accidents.**



- Reciprocating engines are generally used for small aircrafts. Hence mostly used in CESSNA and Piper. This explains the high number of accidents.
- Turbo fan engines are used for commercial planes e.g Boeing 747, Boing 767. It is a good engine type to purchase.
- Turbo Jet engines offer high thrust and performance at high speeds, making them ideal for fast planes, military and supersonic applications.
- For electric and LR engine, they are less common and have less data.
- Turbo jet and Turbo fan engines seem to be the best engine categories.
- **Turbo jet** being the best for business purpose

RECOMMENDATIONS

KEY FINDINGS

- Cessna and Piper have the highest number of accidents.
- Personal and instructional use lead in flight purposes with accidents.
- Reciprocating engines (used in Cessna and Piper) have more accidents.
- Turbo Jet engines are more reliable for business purposes.

RECOMMENDED AIRCRAFT

Factors:

- Turbo Jet engine as it has lowest accidents.
- Business, Executive/corporate flight purpose as the comapny wants to use planes for commercial purposes
- All planes involved in Accident investigation type
- Minor aircraft damage

Cessna 560 identified as the lowest risk aircraft.

Evaluation & Future Improvement Ideas

- Incorporate more recent data as it becomes available.
- Conduct a cost-benefit analysis for each recommended aircraft.
- Monitor emerging trends in aviation safety and technology advancements.

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Portfolio


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