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Aviation Business Analysis

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Business Context

•**Problem Statement**:

- The company is expanding into the aviation sector but lacks insight into the risks associated with purchasing and operating aircraft for both commercial and private operations.

•**Objective**:

- Identify aircraft models that present the lowest risk in terms of safety and operational reliability.
- Guide informed decision-making for aircraft acquisition.

Key Stakeholders:Company Stakeholders, Potential Investors, Policymakers, Competing Airlines, and Customers.

Success Criteria: Successful entry into the aviation industry with the purchase of a low-risk aircraft.Achieving a good return on investment.

Data Understanding

Data Source:

•National Transportation Safety Board (NTSB) dataset covering aviation incidents from 1962 to 2023.

•Description of data

Key columns

•**Aircraft Information**: Make, model, engine type, and number of engines.

•**Incident Information**: Injury severity, total injuries, accident causes, flight phase, weather conditions.

•**Outcomes**: Fatalities, serious injuries, minor injuries, and number of uninjured passengers.

•Event Date: The date when the aviation accident or incident occurred.

• Location: The geographic location where the incident took place.

•Aircraft Make and Model: The manufacturer and specific model of the aircraft involved in the accident.

•Broad Phase of Flight: The general phase of flight during which the accident occurred.

•Total Fatal Injuries: The total number of fatalities resulting from the accident.

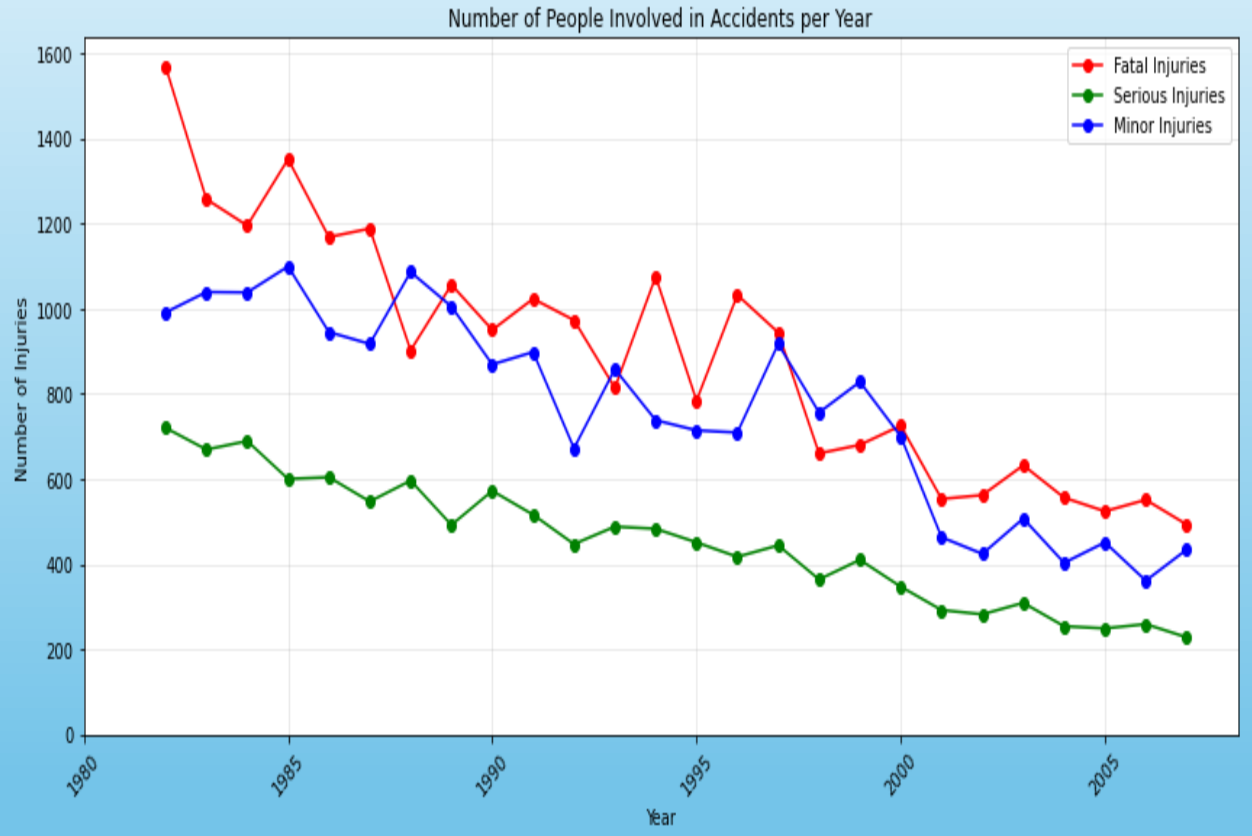
•Total Serious Injuries: The total number of serious injuries (non-fatal) resulting from the accident.

•Total Minor Injuries: The total number of minor injuries resulting from the accident.

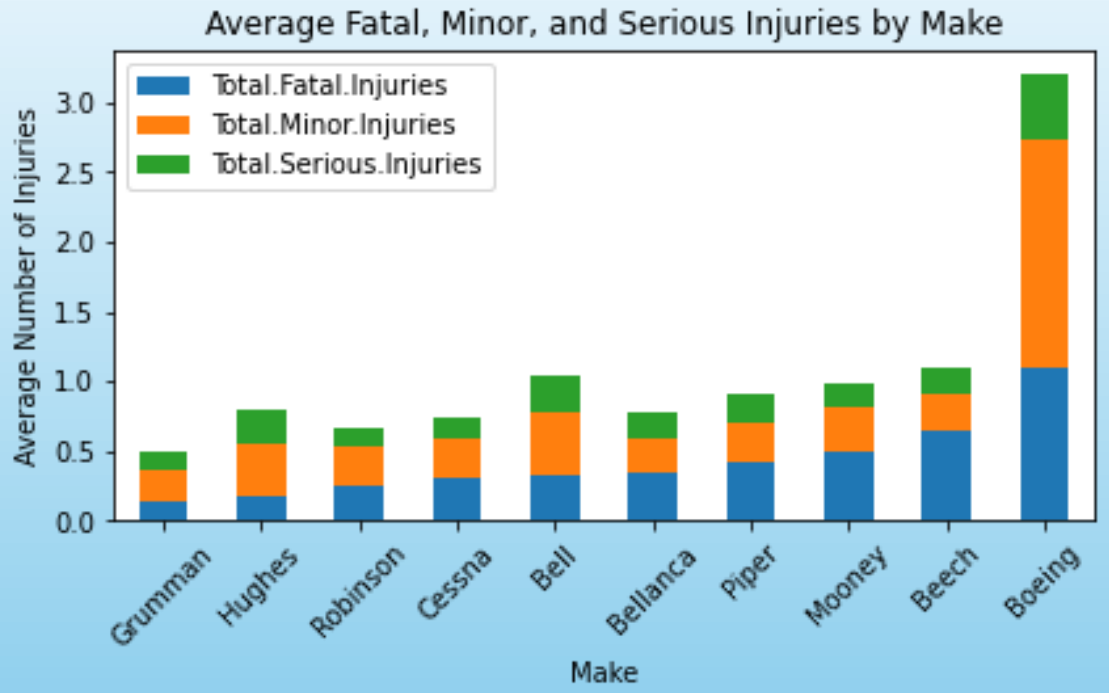
Data Cleaning
Checking and Dropping duplicates to ensure the data is workable
Missing values were handled, especially in critical columns such as Make, Model, and Total Injuries.
In this analysis, I aim to focus on the most relevant data to enable making of informed recommendations. As such, I have decided to perform data reduction by dropping certain columns from this dataset. This step will simplify our data and make it easier to handle, without losing the information that is crucial to our analysis
filtered Data from 1982 onwards to focus on recent trends and patterns.
Created variables such as injury proportions for deeper insights.

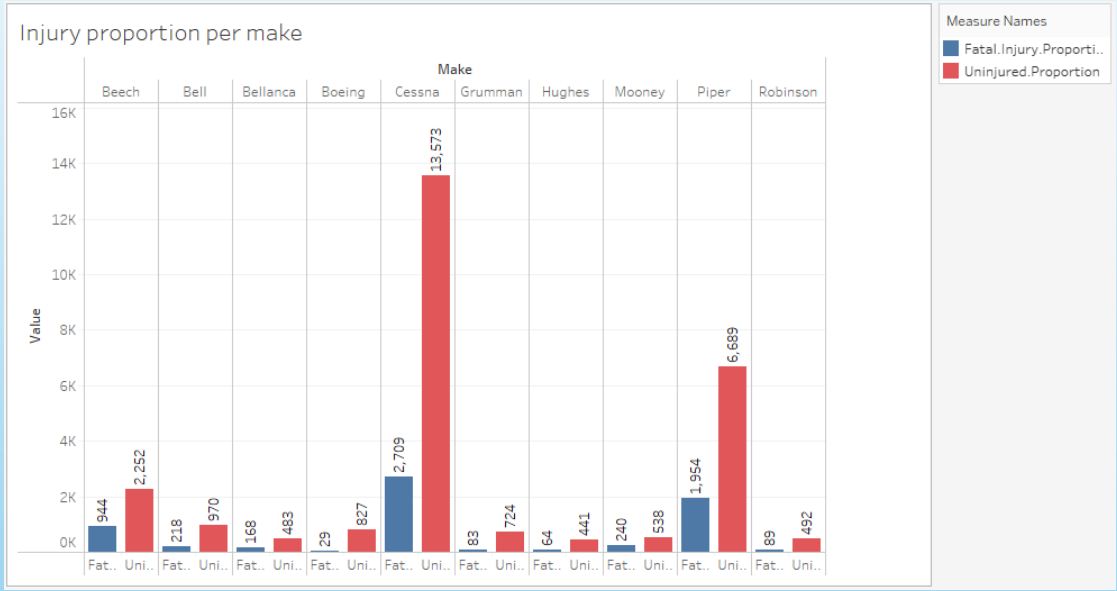
Exploratory Data Analysis (EDA)Descriptive Statistics:
Basic statistics were calculated for each

feature.Trend Analysis: I analyzed Injuries and fatalities over time to identify patterns.
Visualizations: Graphs, such as bar plots, line plots, and pie charts, were used to present data on injury severity, aircraft makes, and engine types.Modeling &
AnalysisGrouping by Aircraft Makes: Identified the top 10 manufacturers (e.g., Boeing, Airbus) and compared their safety records.
Analysis by Engine Type: Examined the relationship between engine type (e.g., Turbojet, Piston) and accident outcomes.
Injury Proportion Analysis: Created new features to compare the ratio of fatalities and uninjured passengers across different models and years.

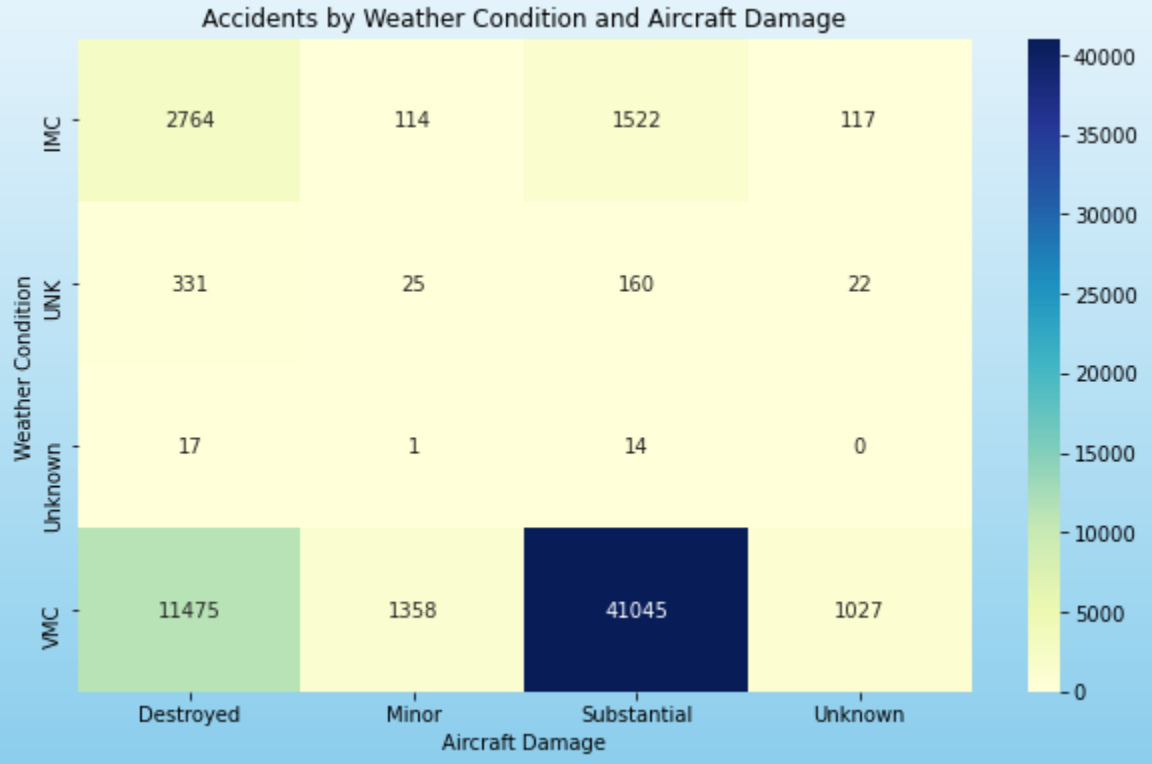


As seen in the time series graph the number of accidents has been on the decline over the years hence air travel is becoming a more safe means of transport and good venture for our company

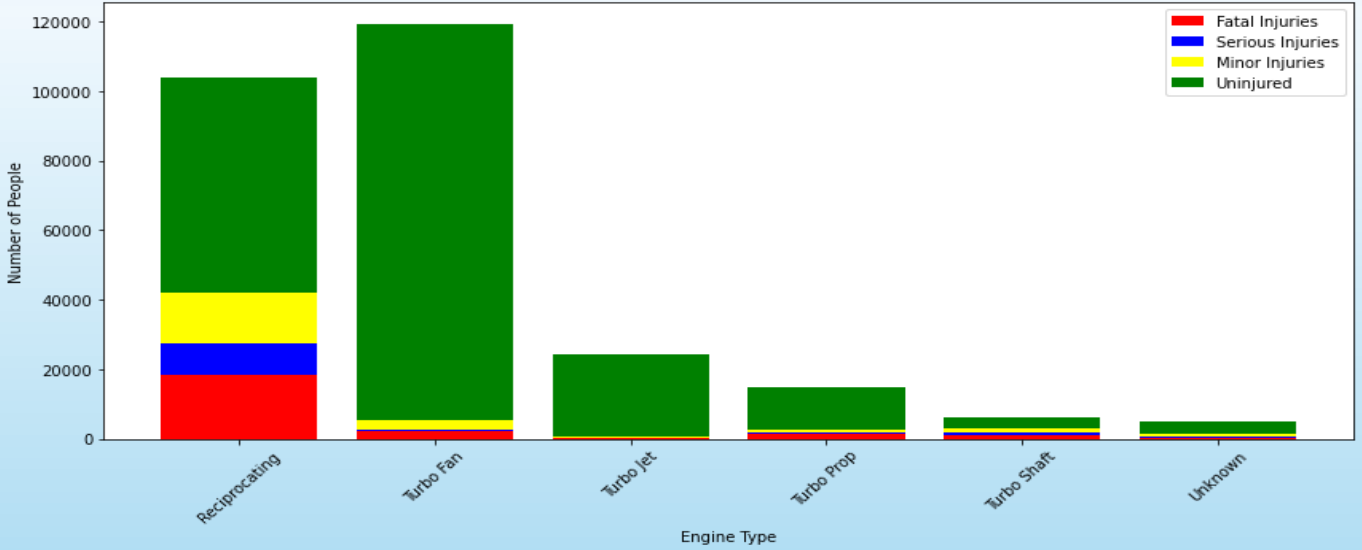




analysis of injuries by make shows that that although boeing has the thighest number of injuries ii also has the highest number of uninjured per total passengers this is due to its large carrying capacity while aircrafts like Cessna have high fatality rates with low carrying capacity hence boeing and Grumman aircraft are a better choice for the company than Cessna and piper



From the Weather Condition and aircraft damage heatmap, it is evident that:
Pilots cause accidents under clear conditions when the visibility is very clear (VMC).
- This necessitates adequate and continuous training of the pilots.



- Reciprocating engines have the highest number of fatal injuries, followed by a significant number of serious and minor injuries.
- Turbo fan engines are associated with the highest overall number of incidents, but most of these result in no injuries (uninjured category).Turbo jet, turbo prop, and turbo shaft engines show progressively fewer incidents, with a mix of outcomes but generally fewer injuries compared to reciprocating and turbo fan engines.

Aircraft Acquisition: Focus on aircraft models from manufacturers with a proven safety record, such as Boeing and Airbus.Engine Type
Preference: Consider models with turbojet or turboprop engines, as they have lower fatality rates.
Operational Considerations: Improve safety protocols, especially during high-risk phases like takeoff and landing.

The analysis also highlighted specific aircraft makes and models, such as Cessna and Piper, which have higher accident frequencies, possibly due to mechanical issues.

Further Research: Additional investigation into maintenance and operational costs for selected models to ensure cost-effectiveness.

THANK YOU

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