Title: Assessing Aircraft Risk for Business Expansion
Subtitle: Using Data to Guide Safe Aircraft Purchases

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Business Problem

Overview:

- Our company is venturing into aviation to diversify.
- We need to identify low-risk aircraft for both commercial and private operations.

Objective:

- Provide actionable insights to guide safe aircraft investment and minimize risk.

Business Understanding

- **Approach:**
- I applied CRISP-DM methodology for a structured analysis.
- My Key Focus Areas:
  - Risk assessment of various aircraft models.
  - Predicting accident likelihood based on historical data.
  - Evaluating how environmental and operational factors impact risk.

Objectives

- Identify aircraft makes with the lowest risk.
- Determine which models are more prone to accidents.
- Analyse the effect of environmental conditions on accident rates.
- Assess the feasibility of investing in amateur-built aircraft.
- Examine how the purpose of the flight impacts risk levels.

Data Overview

Dataset:

- Source: Kaggle - Aviation Accident Database Synopses

Key Attributes:

- Aircraft make and model
- Incident and accident records
- Weather conditions at the time of incidents
- Severity of injuries

This dataset provides comprehensive accident records and environmental conditions, allowing for detailed risk analysis of aircraft models.

Data Cleaning & Preparation

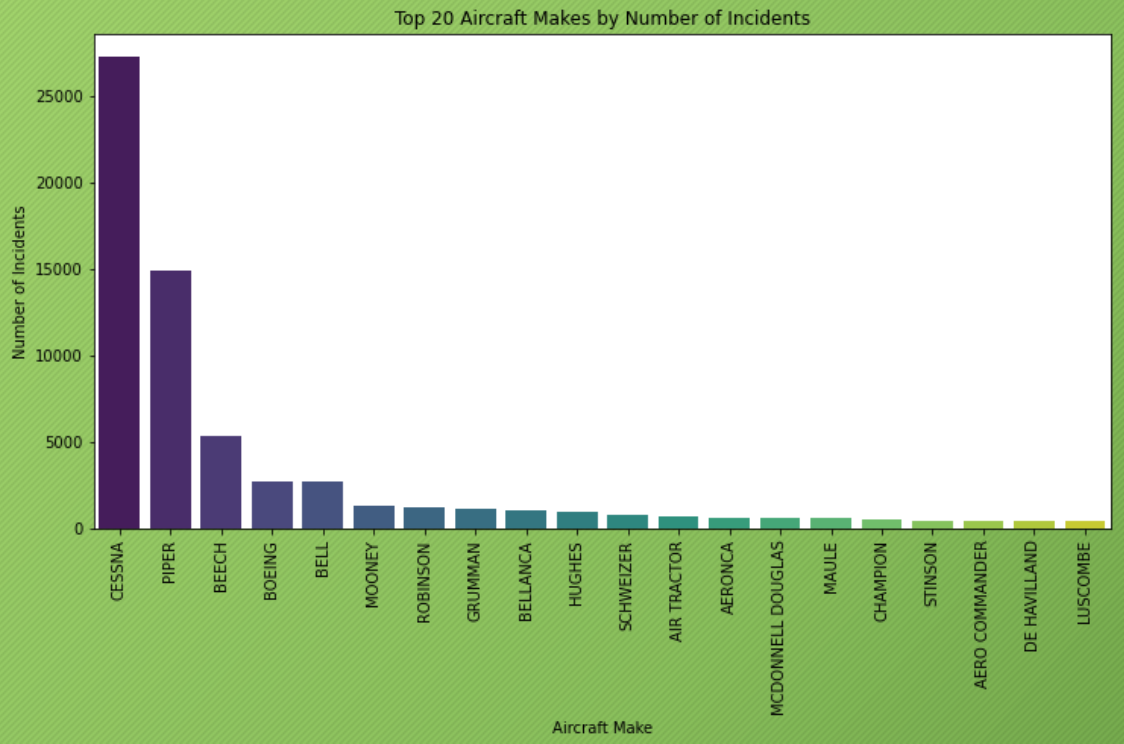
Steps:

- Addressed missing values in key columns such as Make and Model.
- Standardized entries to ensure consistency (e.g., converting "Unk" to "UNK").
- Feature Engineering:
  - Simplified aircraft make entries (e.g., "CESSNA 172" to "CESSNA").
  - Ensured consistent reporting of injury severity for accurate analysis.

The Data cleaning and preparation ensure that our analysis is based on accurate and uniform information.

Key Visualizations

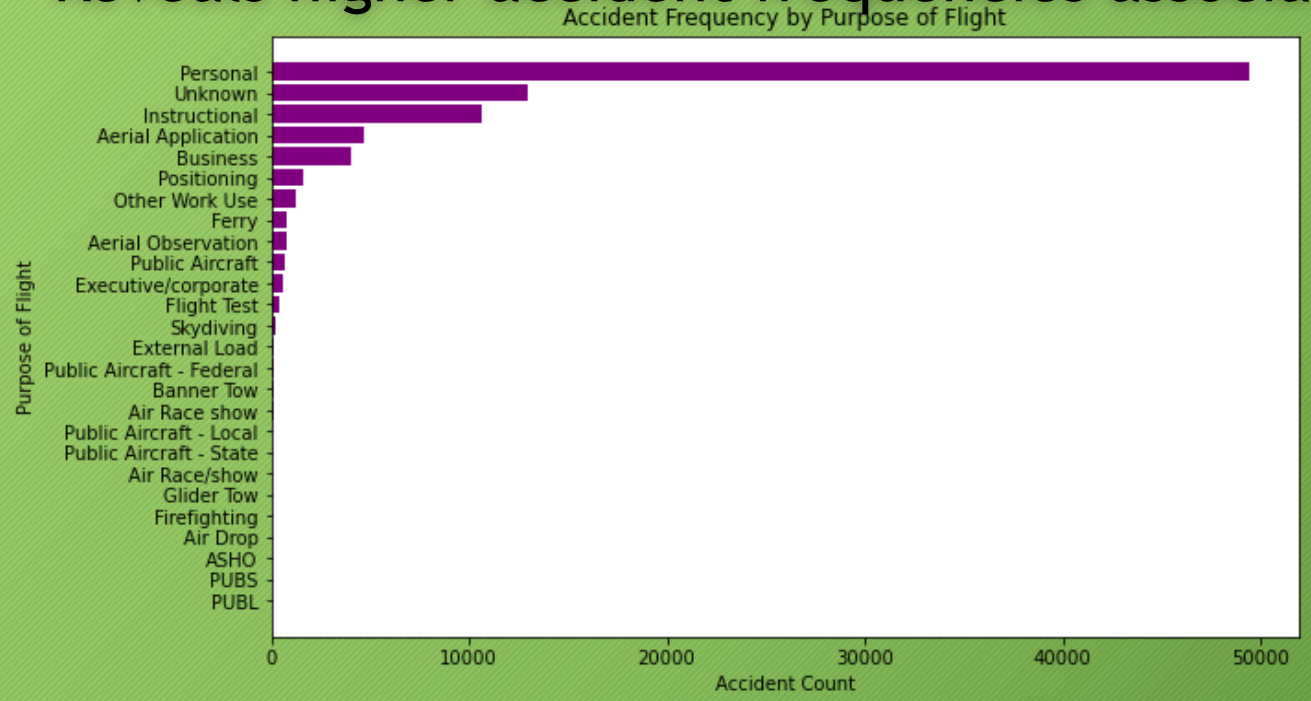
- **Accident Frequency by Make and Model:**
- Bar chart visualizing the number of accidents per aircraft make and model.
- Helps identify which aircraft are involved in the most incidents.



This visualization highlights high-risk aircraft based on accident frequency, giving guide toward safer investment choices.

Accident Frequency by Purpose of Flight

- **Analysis:**
- Bar chart showing accident rates based on flight purpose (e.g., commercial, private).
- Reveals higher accident frequencies associated with private flights.



Understanding accident rates by flight purpose helps us evaluate the risk associated with different types of operations.

Findings

1. **Low-Risk Criteria:**
    1. Aircraft with fewer accidents and lower injury severity.
    2. Consistent performance across different environments and flight phases.
2. **Environmental Factors:**
    1. Adverse weather conditions correlate with higher accident rates.
    2. Geographical challenges increase risk.
3. **Flight Purpose:**
    1. Private flights generally showed higher risk compared to commercial flights.
    2. Cargo and training flights exhibit varying risk levels based on operational nature.

Recommendations

- **Avoid** aircraft models with high accident frequencies and severe incidents.
- **Consider** environmental factors like weather patterns when planning operations.
- **Tailor** aircraft selection to the intended flight purpose to mitigate risks.
- **Invest** in aircraft with robust safety records and proven reliability.