langat-che /
Aircraft-Incident-Analysis

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This is a DS project whereby we study aircraft data to determine how the company can start operating airplanes for commercial and private enterprises

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Aircraft Incident Analysis: Identifying Low-Risk Aircraft

📖 Overview

Our company is expanding into the aviation industry. To support this venture, we conducted a data-driven analysis of historical aviation event data to identify aircraft types with the lowest risk profiles. This project focuses on understanding event patterns, assessing risks, and providing actionable recommendations to guide aircraft purchases.

📊 Problem Statement

The company seeks to diversify its portfolio into the aviation sector but lacks insights into the risks associated with different aircraft types. The goal is to identify low-risk aircraft for commercial and private operations using historical data.

Key Question: Which aircraft types pose the lowest risk for our business?

🎯 Objective

1. Identify aircraft makes and models with the lowest risk profiles.
2. Provide insights into patterns and trends related to aviation events.
3. Guide stakeholders with actionable recommendations for aircraft selection.

📁 Dataset Overview

Dataset Source: Historical aviation event data sourced from a published kaggle repository. View the Dataset
The analysis is based on historical aviation event data with the following key features:

- **Event Details**: Date, location, weather conditions, and flight phase.
- **Aircraft Information**: Make, model, purpose of flight, and category.
- **Injury and Damage Data**: Fatalities, injuries, severity, and aircraft damage.

Data Cleaning and Preparation

- Handled missing values for critical features.
- Aggregated numerical fields like injuries and fatalities.
- Standardized categorical features for consistent analysis.

🔍 Analysis Steps

1. **Data Exploration**:
   - Examined distributions of events by aircraft make and model.
   - Analyzed trends in incidents over time and under different conditions.
2. **Visualization**:
   - Bar charts to highlight the frequency of incidents.
   - Line charts to show trends in events per year.
   - Heatmaps to explore correlations between flight phases, weather, and severity.
3. **Risk Assessment**:
   - Focused on identifying aircraft with high safety performance.

📈 Key Findings

- **Most Common Aircraft**: A small subset of aircraft makes accounts for the majority of events. (e.g Cessca and Piper)
- **Event Trends**: Incidents gradually reduce annually but increase in adverse VMC weatherconditions.
- **Severity Patterns**: Takeoff and landing are the most critical phases with higher risks.
- **Purpose of Flight**: Personal flights exhibit higher incident rates compared to business or commercial flights.

✅ Recommendations

1. **Aircraft Selection**:
   Prioritize aircraft makes/models with lower incident rates and less severe outcomes.
2. **Safety Protocols**:
   Invest in training programs for critical flight phases (e.g., takeoff and maneuvering).
3. **Weather Preparedness**:
   Enhance training and preparation for adverse weather conditions.
4. **Ongoing Monitoring**:
   Continuously evaluate risks and adapt strategies based on emerging trends.

📂 Repository Contents

- **Data**: The cleaned dataset and raw data files.
- **Notebooks**: Jupyter Notebooks used for data cleaning, exploration, and visualization.
- **Visuals**: Graphs and charts generated during the analysis. Tableu Link
- **Presentation**: PowerPoint slides summarizing the project findings. Presentation Link

🤝 Acknowledgements

Thanks to all contributors and stakeholders for their input and support in making this project successful.

📬 Contact

For questions or feedback, feel free to reach out at langatchebetbev@gmail.com.

Releases

No releases published
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Packages

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Languages

- **Jupyter Notebook** 100.0%