

AVIATION SAFETY ANALYSIS

Presented by: Margaret Mondia

Data Science Student

 Margaret.Mondia@student.moringaschool.com

 <https://www.linkedin.com/in/margaret-mondia-8b112b214/>

 Date: October 2025

Overview



- This project analyzes historical aviation accident data to identify the safest aircraft models. The goal is to highlight models with the lowest risk of fatalities and provide data-driven recommendations to guide the purchase of safe and reliable aircraft for both commercial and private operations.
- By cleaning, preparing, and visualizing the dataset, the analysis lays a foundation for insights into aviation safety patterns and supports better decision-making in aircraft procurement.

Business Understanding

Business Context

The company is preparing to launch a new aviation division to diversify the following:

- Charter Services
- Cargo Operations
- Executive travels

Critical Business Questions

1. Which aircraft models and manufacturers have the lowest historical accident rates?
2. What are the most common causes of incidents?
3. How to minimize safety risks and insurance cost.

The outcome will be a set of actionable recommendations including a prioritized list of low-risk aircraft for procurement and insights that can shape safety protocols, ultimately reducing accident risk, lowering insurance costs, and ensuring the division's long-term safety and profitability.

Data Understanding

Dataset Characteristics

- Data Source – Kaggle
- Data name – Aviation Accident Data
- Records – 23, 967 global accident records

Key Feature of Data

- Accident data and location
- Aircraft type and manufacturer
- Operator and registration
- Fatalities count
- Accident category

Data Understanding

Data Limitations

1. Missing values eg Registration, operator and fatalities
2. Inconsistent naming eg Aircraft type variation
3. No exposure data eg Flight hours/fleet size

Data Preparation

Data Cleaning steps

Steps	Action
Dates	Convert date to datetime format
Fatalities	Change from Object to numeric
Aircraft	Standardize names
Categories(missing values)	Fill with “Unknown”
Cleaning	Drop Critical missing rows

Data Preparation

Results after preparation

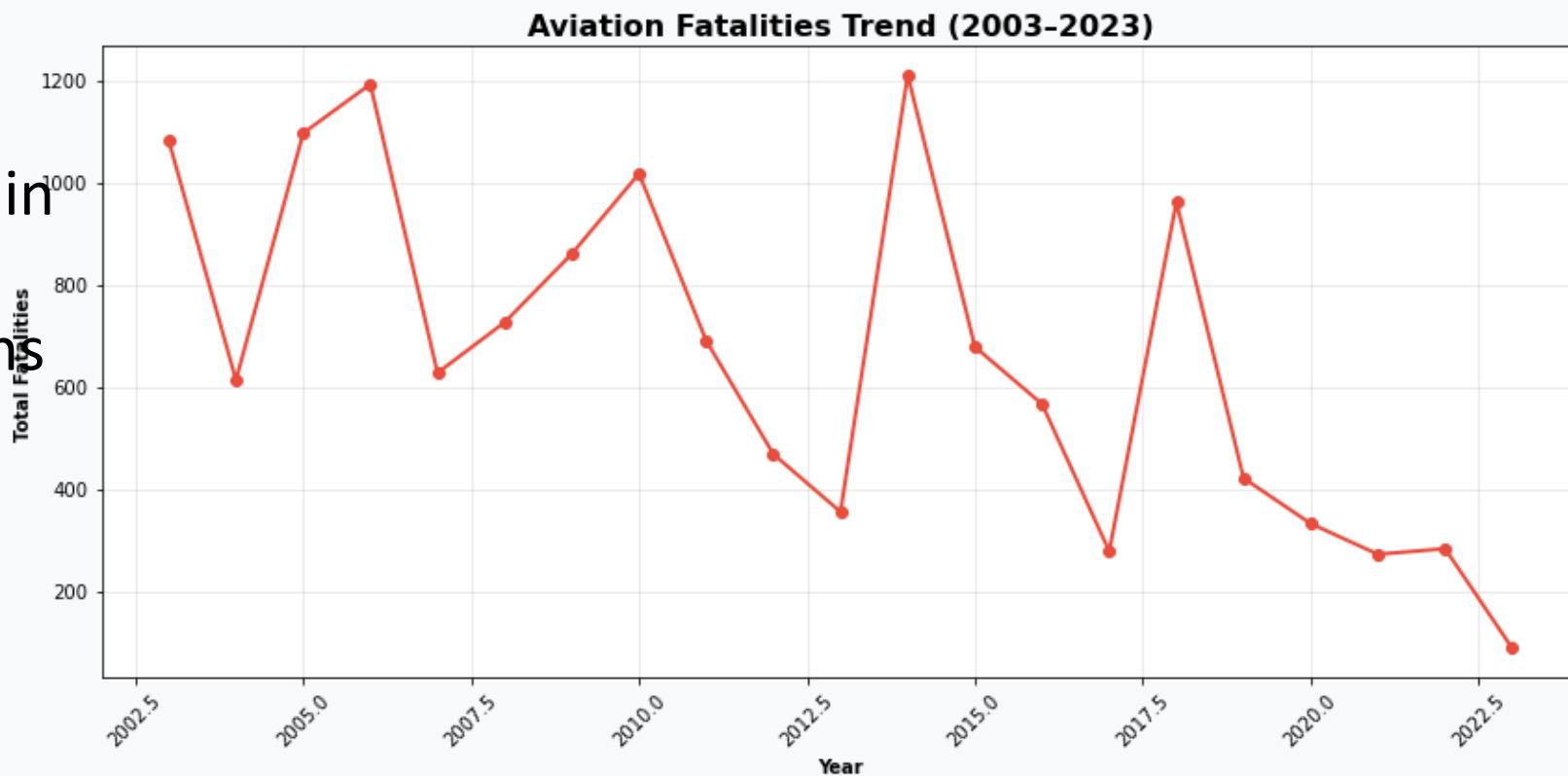
- From initial 23, 967 records with inconsistencies to 23, 408 clean records.
- “Cleaned_df.csv” for analysis

Data Analysis

Fatalities Trend across 20 years

Observations

- Overall declining trend in aviation fatalities
- Year-to-year fluctuations present
- Recent years show improved safety



Data Analysis

Aircraft-Operator Safety Ranking

The best 5 Aircrafts:

- A.W.AW-650 ARGOSY 222
- A.W. AW.27 ENSIGN I
- AIRBUS A300
- AIRBUS A300B2-1C
- AIRBUS A300B4

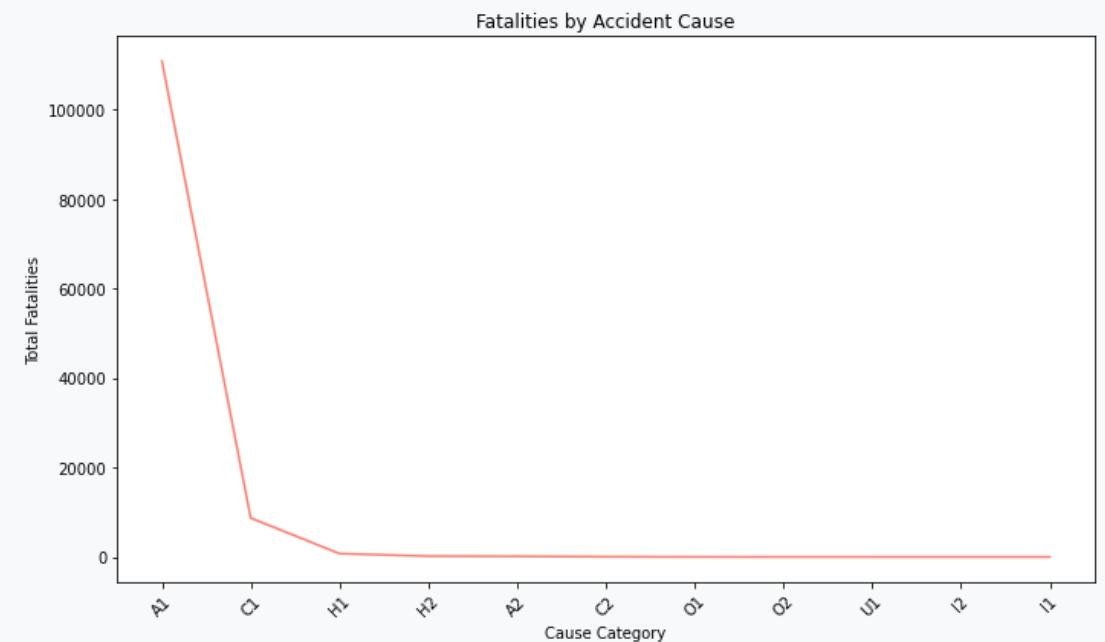
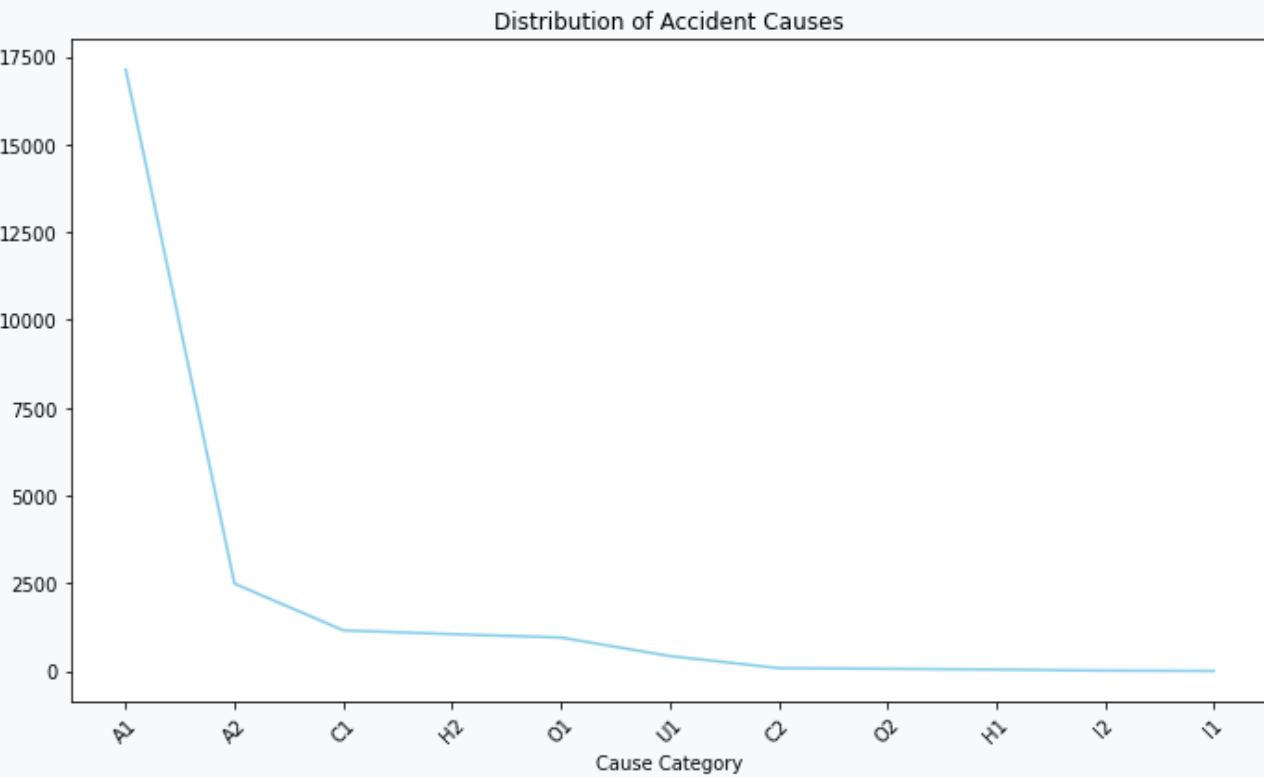
Best Operators:

- BEA
- BOAC
- American Airline
- Air Inter
- Eastern Air Lines



Data Analysis

Accident Cause visualization



Recommendation

1. The company should prioritize modern, proven aircraft types by procuring aircraft models with lower average fatalities per accident and strong global safety records.
2. The company should select operators with documented safety culture during leasing and partnerships.
3. The company should develop targeted safety protocols addressing the most common accident causes by enhancing pilot training and decision making to reduce human error, investment in predictive maintenance systems to minimize mechanical failures

What next?

Immediate actions

- Procure Tier 1 craft model
- Develop Customized training programs
- Establish safety monitoring boards

Expected Business Impact

- Reduced accidents by 40-50%
- Cost saving through insurance by 25-35%
- Long-term sustainability by the business being profitable
- Good reputation

Thank You!

Margaret Mondia

Data Scientist

margaret.mondia@student.moringaschool.com

<https://github.com/megmondia-spec>

****Building safer skies through data-driven
decisions****