

CRISP DM

Aviation Project

Business Understanding

Objectives

- Identifying trends in aviation incidents and their causes.
- Analyzing regional variations in aviation incidents.
- Tracking injuries and fatalities across different aircraft categories.
- Supporting strategic decision-making to improve aviation safety.

Questions to Guide the Analysis

- **Safety Trends:** What are the trends in aviation incidents over time?
- **Geographic Analysis:** Which countries or regions have the highest number of incidents?
- **Injury Analysis:** What is the breakdown of total fatalities, minor injuries, and serious injuries?
- **Purpose of Flight:** Which flight purposes (e.g., personal, commercial, or training) are associated with the highest incident rates?
- **Aircraft Details:** Are certain makes or categories of aircraft more prone to incidents?

Metrics to Highlight

The metrics explain the goals that the analysis seeks to achieve.

- **Total Incidents:** Total number of aviation incidents in the dataset.
- **Severity Metrics:** Fatalities, serious injuries, and minor injuries.
- **Top Affected Locations:** Countries or regions with the most incidents.
- **Broad Phases of Flight:** Which phases (e.g., landing, takeoff) see the most incidents.
- **Aircraft Categories:** Breakdowns by aircraft type.

Dashboard Recommendations

The top section will have an overview of the key metrics which include Total incidents, fatalities, and injuries. The trendline will display a time-series chart of incidents by the year.

The middle section will have the geographic map that highlights the incident of distribution by country or regions. The Bar chart shows the distribution of incidents by purpose of flight and aircraft type.

The line chart explains the trends of incidents over time by severity

The tables explain the breakdown of incidents per country.

Data Understanding

Dataset Purpose: An analysis of aviation incidents to identify trends, regional hotspots, and injury patterns to improve aviation safety.

The data comes from the government aviation safety boards and it is publicly available in the Kaggle website.

•**Key Fields:**

- **Event ID:** Unique identifier for each aviation incident.
- **Location and Country:** Geographic details of the incidents.
- **Event Date:** When the incident occurred.
- **Injury Severity:** Indicates the level of injury (e.g., Fatal, Serious, Minor).
- **Aircraft Details:** Information about aircraft type, purpose of flight, and engine specifications.
- **Total Injuries:** Fatalities, serious injuries, minor injuries, and uninjured individuals.
- **Weather Conditions:** Environmental conditions during the incident.

Data Description

- The key variables are: latitude, longitude, Event Date, country, Aircraft make/model, Total Fatal/Serious/Minor Injuries, Purpose of Flight
- Data Types: Categorical and Numerical.

Handling Missing Data

- Fields with missing values were addressed through dropping the columns and replacing using mean, median and mode.
- Fields such as Injury-related were replaced with 0.

Data Preparation

- ▶ Data Integration
- ▶ Combine relevant fields from the dataset to create a dataset for the project objectives.
- ▶ Ensure that fields like "Total Fatal Injuries," "Total Serious Injuries," and "Total Minor Injuries" are aggregated or standardized for analysis.

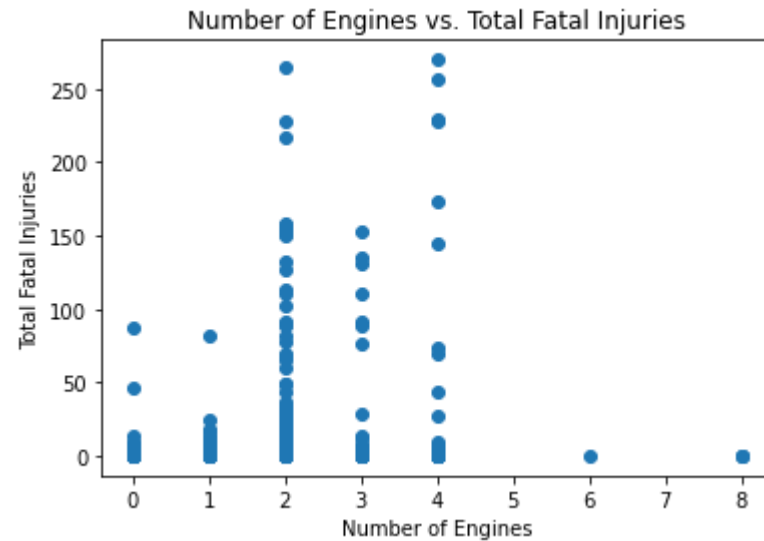
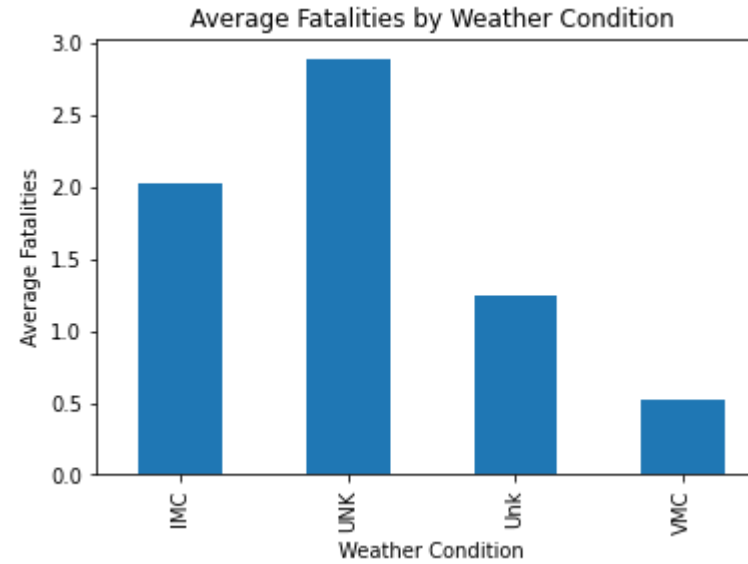
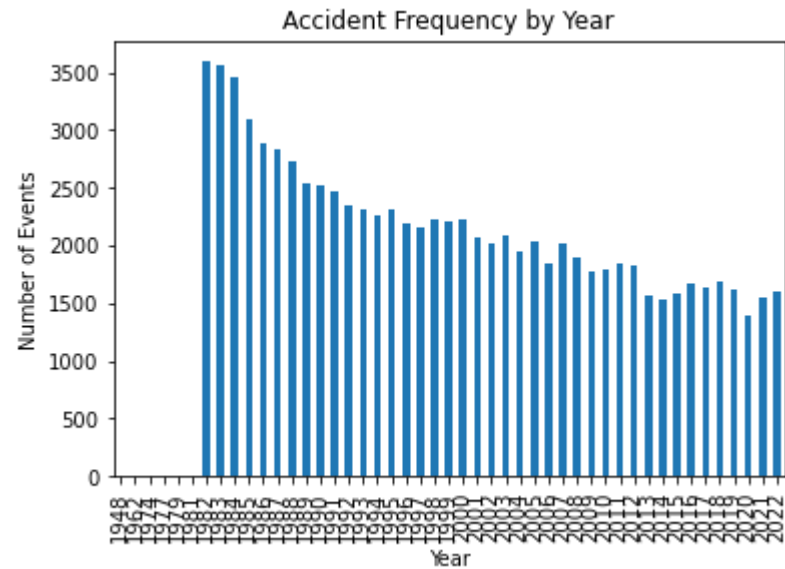
Tasks Involved

- ▶ Data Transformation
 - ▶ Convert textual data into consistent formats.
 - ▶ Derive new columns where needed
 - ▶ Normalize numerical data to simplify trend visualization
- ▶ Data Reduction
 - ▶ Reduce unnecessary fields that do not contribute to the project objectives.
 - ▶ Exclude outliers

Modeling

- ▶ Clear visualizations representing trends, geospatial insights, and category comparisons.
- ▶ Actionable insights into aviation incident causes, severity patterns, and high-risk locations.
- ▶ Interactive dashboard providing an intuitive way to explore the data dynamically.

Visualizations



Conclusions and Recommendations

- ▶ The average fatalities are affected by weather condition. Most of the accidents have turned out fatal with a high percentage of total fatal injuries.
- ▶ The make and model of the plane have a lower impact on the number of fatalities.
- ▶ Aviation incidents and injuries exhibit identifiable trends over time, with some years having a significant spike in incidents. These trends may align with factors like increased air traffic, regulatory changes, or geopolitical events.
- ▶ Flights with specific purposes, such as training and personal travel, show higher incident rates compared to commercial or business flights. This suggests varying levels of risk management and operational oversight.

Recommendations

- ▶ Strengthen Aviation Safety Regulations
- ▶ Enhance Pilot Training and Certification
- ▶ Invest in Weather Risk Mitigation
- ▶ Focus on Geographical Risk Reduction