**Exploratory Data Analysis (EDA) on AIRCRAFT AIRCRASH ANALYSIS (1908 - 2024)**

**Introduction**

Based on the data provided from “aircraftFullDataUpdated\_2024.csv” I conducted an Exploratory Data Analysis to uncover patterns, trends, and insights about air crashes from 1908 till 2024.

**Data Overview**

The dataset contains information about air crashes worldwide, including:

* Date of these accidents (year, Month Day, Quarter, Decade, Season)
* Country or Region
* Aircraft Manufacturer
* Aircraft Model
* Aircraft Operator
* Fatalities (Ground, Air)
* Total Aboard
* Survivor

**Decades Trends**

From the Time-series visualization:

* Air crashes show a general downward trend since the **1970s** despite increase in air traffic in relation to population increase
* Peak years for appear to be in the **1950s – 1960s** with the total air-crashes of **653** and **652** respectively.
* And a second peak in the **1990s** with a total of **633** air-crashes with factors that may have included **maintenance issues, pilot errors, weather conditions** etc. which paved way for increase stricter safer airplane policies that made a significant decrease in air-crashes in the year **2000s**
* Significant improvement in safety since the **2000s** therefore a significance decrease which is a **95.285%** decrease

**Seasonal Patterns**

* the season with the highest air-crashes is **winter** with a total of **1,326**, which is slightly above the fall season with a total of **1,324** this is due to major factors like very **harsh weather conditions, like now storms, heavy rainfalls, snow storms and hail storms**
* the lowest season was the **spring** with **1,138** followed with the season of **summer** with **1,247** air-crashes
* No strong monthly seasonality apparent

**Monthly Patterns**

* **Highest Crash Incidence in December**: **December** has the highest number of air crashes with **497** air-crashes recorded which could be linked to **holiday travel surges, bad winter weather, and hectic flight schedules**.
* **Winter Months Dominate the Chart**: **December, January, and September** top the list months that often involve: Seasonal transitions, Heavy passenger traffic, Weather volatility (snowstorms, fog, etc.)
* April is the Safest Month.

**By Country/Region**

* **High-risk areas appear to include**: Southeast Asia, Northern South America, Central Africa
* Developed regions with high air traffic (North America, Western Europe) show relatively fewer accidents per flight volume
* **Russia** has the most accidents in absolute numbers with a total of **249** (**due to high air traffic and war**)
* Some developing nations show higher accident rates per flight

**NOTE: a number of 480 air-crashes from unknown Countries/Regions were recorded**

**By Aircraft Type**

* Older aircraft models appear more frequently in accident data
* Military aircraft appear in a significant portion of accidents

**By Operator**

* Cargo and private operations have higher accident rates
* Military operations account for a notable percentage
* Commercial airlines show improving safety records

**Fatality Trends**

* Despite decreasing accident numbers, individual accidents can be catastrophic (high fatality events still occur)
* Average fatalities per accident may be increasing due to larger aircraft

**Fatality Rate**

From the pie chart a lot can be derived:

* **High Risk of Total Fatality**: **63.7%** of air crashes result in **total fatalities**, meaning no survivors. This suggests that when an air crash is severe, it’s highly likely to be fatal for everyone on board.
* **Proportion of Partial Survival**: **34.9%** of incidents result in **non-total fatalities**, meaning some people survive. This shows that not all crashes are completely deadly there's a one-in-three chance of partial survival.
* **Total Survival is Extremely Rare**: Only **1.4%** of crashes result in everyone surviving. This emphasizes how rare it is for an air crash to be entirely non-fatal.

**Key Insights**

1. **Safety Improvements**: Aviation has become significantly safer over time despite increased traffic.
2. **Regional Disparities**: Developing regions show higher accident rates, suggesting infrastructure and regulation play key roles.
3. **Human Factors**: Remain the dominant contributor to accidents despite technological advances.

**This EDA suggests that while air travel has become remarkably safe, targeted improvements in training, maintenance, and infrastructure could further reduce accidents, particularly in developing aviation markets.**