**SYNOPSIS**

**PROJECT TITLE : FLIGHT DELAYS AND CANCELLATIONS DATA ANALYSIS**

**STUDENT : KUSHI N AF0377854**

**ABSTRACT**

The analysis of flight cancellation and delay data is crucial for enhancing the efficiency and reliability of air travel. This study aims to delve into the patterns and factors contributing to flight disruptions, providing valuable insights for airlines, passengers. By examining historical data, we can identify trends, common causes, and potential areas for improvement. Such an analysis not only helps in understanding the operational challenges faced by airlines but also aids in developing strategies to minimize delays and cancellations, ultimately improving the overall travel experience for passengers.

**Datasets description**

YEAR :Year of the Flight Trip

MONTH : Month of the Flight Trip

DAY : Day of the Flight Trip

DAY\_OF\_WEEK : Day of week of the Flight Trip

AIRLINE : Airline Identifier

FLIGHT\_NUMBER : Flight Identifier

ORIGIN\_AIRPORT : Starting Airport

DESTINATION\_AIRPORT : Destination Airport

SCHEDULED\_DEPARTURE : Planned Departure Time

DEPARTURE\_TIME : WHEEL\_OFF - TAXI\_OUT

DEPARTURE\_DELAY : Total Delay on Departure

TAXI\_OUT : The time duration elapsed between departure from the origin airport gate and wheels off

WHEELS\_OFF : The time point that the aircraft's wheels leave the ground

SCHEDULED\_TIME : Planned time amount needed for the flight trip

ELAPSED\_TIME : AIR\_TIME+TAXI\_IN+TAXI\_OUT

AIR\_TIME : The time duration between wheels\_off and wheels\_on time

DISTANCE : Distance between two airports

WHEELS\_ON : The time point that the aircraft's wheels touch on the ground

TAXI\_IN : The time duration elapsed between wheels-on and gate arrival at the destination airport

SCHEDULED\_ARRIVAL : Planned arrival time

ARRIVAL\_TIME : WHEELS\_ON+TAXI\_IN

ARRIVAL\_DELAY : ARRIVAL\_TIME-SCHEDULED\_ARRIVAL

DIVERTED: Aircraft landed on airport that out of schedule

CANCELLED : Flight Cancelled (1 = cancelled)

CANCELLATION\_REASON: Reason for Cancellation of flight: A - Airline/Carrier; B - Weather; C - National Air System; D – Security

AIR\_SYSTEM\_DELAY : Delay caused by air system

SECURITY\_DELAY : Delay caused by security

AIRLINE\_DELAY : Delay caused by the airline

LATE\_AIRCRAFT\_DELAY : Delay caused by aircraft

WEATHER\_DELAY : Delay caused by weather

**Dataset Link –**

**Official website:** https://www.kaggle.com/code/bobirino/predicting-flight-delay

**Importance of Analyzing Flight Delays and Cancellations:**

1. **Passenger Experience:** Delays and cancellations can significantly affect passenger satisfaction and loyalty. Analyzing this data helps in improving customer service and communication.

2. **Operational Efficiency:** Airlines and airports can optimize their operations, reduce costs, and improve resource allocation by understanding the underlying causes of disruptions.

3.**Financial Impact:** Delays and cancellations often result in additional costs for airlines, including compensation, rescheduling, and resource management. Analyzing these factors can help mitigate financial losses.

4. **Regulatory Compliance:** Regulatory bodies require airlines to report and manage delays and cancellations. Data analysis helps ensure compliance with aviation regulations and standards.

5. **Predictive Insights:** Advanced data analysis techniques, such as machine learning and statistical modeling, can predict potential delays and cancellations, allowing proactive measures to be implemented.

**Key Factors in Flight Delays and Cancellations:**

* Weather Conditions: Severe weather is a leading cause of flight disruptions. Understanding weather patterns can help in better planning and scheduling.
* Air Traffic Control: Congestion and management issues in air traffic control can lead to delays. Analyzing air traffic data provides insights into peak times and potential bottlenecks.
* Technical Issues: Aircraft maintenance and technical problems are significant factors. Regular analysis can improve maintenance schedules and reduce unexpected downtimes.
* Operational Factors: Crew availability, airport operations, and logistical challenges also contribute to delays and cancellations.

**Methodology**

The analysis typically involves several steps:

1. Data Collection: Gathering historical and real-time data from multiple sources, including airline reports, airport databases, weather information, and air traffic control logs.

2. Data Cleaning and Preprocessing: Ensuring data quality by handling missing values, correcting errors, and standardizing formats.

3. Exploratory Data Analysis (EDA): Identifying patterns, trends, and anomalies through statistical summaries and visualizations.

4. Modeling and Prediction: Using statistical models and machine learning algorithms to predict future delays and cancellations based on historical data.

5. Evaluation and Interpretation: Assessing the accuracy of models and interpreting the results to provide actionable insights.

**HARDWARE AND SOFTWARE REQUIREMENTS**

**Hardware Requirements:**

Hard Disk : 512GB

Ram : 8GB

Input Devices : Keyboard, Mouse.

**Software Requirements:**

Operating System : Windows 64-bit

Programming Language : Python

Python Libraries : Pandas, Numpy, Matplotlib, Seaborn.

IDE : Jupyter notebook

**PROBLEM STATEMENT**

Flight cancellations and delays disrupt travel plans, cause passenger frustration, and cost airlines significant revenue. While weather is a recognized factor, a comprehensive analysis of flight cancellation and delay data is needed to identify the underlying causes, including potential airline-controllable issues. This analysis will help develop strategies to improve on-time performance, enhance passenger satisfaction, and optimize airline operations.

**CONCLUSION**

In conclusion, this analysis of flight cancellation and delay data has provided valuable insights into the factors impacting air travel punctuality. By understanding the root causes of disruptions, airlines and regulatory bodies can develop targeted strategies to minimize cancellations, reduce delays, and improve the overall air travel experience for passengers. This will not only benefit the industry economically, but also enhance customer satisfaction and ensure a more reliable air transport system.