AIRLINE DATA ANALYTICS FORAVIATION INDUSTRY

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INTRODUCTION:

Airlines Data Analytics for Aviation Industry

The airport codes may refer to either the IATA airport code, a three-letter code that is used in passenger reservation, ticketing and baggage-handling systems, or the ICAO airport code which is a four-letter code used by ATC systems and for airports that donot have an IATA airport code.

Goal of the Project:

To provide better Airline and AirPort services and to avoid delays in Air Travel across different locations at Municipality level. The aim is to provide airports, airlines, and the travelling public with a neutral, third-party view of which airlines are delivering on their promise to get passengers from Point A to Point B on-time.

Project Overview:

1. Users create multipleanalytical graphs/charts/Visualizations.
2. Usingthe Analytical Visualizations, build the requiredDashboard(s).
3. Savingand visualizing the final dashboardin the IBM Cognos Analytics.

LITERATURE SURVEY:

Existing problem :

The airport codes may refer to either the IATA airport code, a three-letter code that is used in passenger reservation, ticketing and baggage-handlingsystems, or the ICAO airport code which is a four-letter code used by ATC systems and for airportsthat do not have anIATA airport code.

Data Science and Analytics in Aviation (2020):

Authors: Sai-Ho-Chung, Hoi-Lam-ma

The researcher in this article cited that, Due to the rapid development of advanced technologies nowadays, a massiveamount of real time data regarding flight information, flight performance, airport conditions, air traffic conditions, weather, ticket prices, passengers comments, crew comments, etc., are all availablefrom a diverse set of sources, including flight performance monitoring systems, operational systems of airlinesand airports, and social media platforms.Development of data analytics in aviation and related applications is also growing rapidly. This paper concisely examines data science andanalytics in aviation studiesin several criticalareas, namely big data analysis,air transport networkmanagement, forecasting, and machine learning. The papers featured in this special issue are also introduced and reviewed, and future directions for data science and analytics in aviation are discussed.

Data Analyticsfor Air Travel Data (2021):

Authors: Haiman Tian, Yudong Tao

The researcher in this articlecited that, industry

hasremarkably connected countries all over the world through rapid long-distance transportation, helping people overcomegeographic barriers. Consequently, this has usheredin substantial economic growth,both nationally and internationally. The airlineindustry produces vast amounts of data, capturing a diverse set ofinformation about their operations, including data related topassengers, freight, flights, and much more. Analyzing air travel data can advancethe understanding of airline market dynamics, allowingcompanies to provide customized, efficient, and safe transportation services. Due to big data challenges in such a complex environment,the benefits of drawing insights from the air travel data in the airlineindustry have not yet been fully explored. They introduce existing data sources commonly used in the papers surveyed and summarizetheir availability. Finally, we discuss several potential researchdirections to better harness airline data in the future.They anticipate this study to be used as a comprehensive referencefor both members of the airline industryand academic scholars with an interest in airlineresearch.

Topological Data Analysis for Aviation Applications (2018):

Authors: Max Z. Li,MeganS. Ryerson and HamsaBalakrishnan

Aviation data sets are increasingly high-dimensional and sparse. Consequently, the underlying featuresand interactions are not easily uncovered by traditional data analysis methods. Recent advancements in appliedmathematics introduce topological methods, offering a newapproachto obtain these features. This paper appliesthe fundamental notionsunderlying topological data analysis and persistent homology (TDA/PH) to aviationdata analytics. We review past aviation researchthat leveragetopological methods, and present a new computational case study exploringthe topologyof airport surfaceconnectivity. In each case, we connect abstracttopological features with real-world processesin aviation, and highlight potentialoperational and managerial insights

Operational Efficiency Versus FinancialMobility in the Global Airline Industry(2015):

Author: Hoi-Lam-ma

The researcher in this article cited that, the events of September 11th,2001precipitated an almost unprecedented financial crisis for the world airline industry. However, it is not clear that these events represent a discrete,industry disruption or whether, in fact, airlines were already enteringa period of economic challenges that would demand new strategicorientations on their part. This study investigates the structural

drivers of operational efficiency as well as the financial posture of airlines on the eve of September 11th.

A sample of 38 airlines from North America, Europe, Asia and the Middle East was utilized to investigate whetherrelative operational efficiency implied superior financial mobility(as defined by Donaldson). Data envelopment analysiswas utilized to derive efficiency scores for individual airlines. The underlying structural drivers of efficiency were then investigated. It was found that the traditional framework developed in the literature still provided reasonable explanatory power for realized relative operational efficiency. However, the second stage of the analysis found that relative operational efficiency did not inherently imply superior financial mobility. As such, airlines that had chosen relatively efficient operational strategies found themselves in positions of vulnerability with regard to financial mobility and thus suffered the consequences in the post-September 11th environment.

An Evaluation of the Operational Performanceand Profitability of the U.S.Airlines (2021):

Author: EmillioCollar

The researcher in this articlecited that, since 2008, a series of mega-mergers has dramatically changed the U.S. airline industry. Despite the presence of fewer airlinesin the market, the competition remainsintense, which forces airlines to continually search for ways to increasetheir efficiency to maintain survival and financialsustainability. To evaluate

airline performance and disentangle thecauses of inefficiency, this paper applied a two-stage network dataenvelopment analysis approach and a truncated regression toinvestigate the performance of nine U.S.-based airlines from 2015 to2019. Our empiricalresults reveal that during the sample period, airlines' operating efficiency steadily improved, but the efficiency inthe profitability stage stagnated. Therefore, strategic resourceallocations are needed for airlinesto see further advances in their overall efficiency. On average, airlinesoperating in the low-cost business model yielded higher influence on operating efficiency, a larger number of full-timeemployee equivalents hinders efficiency outcomes, which indicates theimportance of enhancing labor efficiency among carriers.

The Relationship Between On-Time PerformanceAnd Airline MarketShare(2020):

Author:Yoshinori Suzuki

The researcher in this article cited that, we propose a new method of modeling the relationship between on-time performance and market share in the airline industry. The idea behind the method is that the passengers' decision to remain (use same airline) or switch (use otherairlines) at time *t* depends on whether they have experienced flight delays at time *t*−1 or not. More specifically, we posit that the passengers who experienced flightdelays are more likely to switch airlines for the subsequent flight than those passengers who did not experience delays. To capture such effect, wedevelop an aggregate- level Markovian type model that estimates the transition probability matrices separately for

the passengers who experienced flight delays at time *t*−1 and for those who did not experience delays. The model was calibrated with the US DOT data. The study results imply that, once experiencing flightdelays, passengers are more likely to switch airlines. The results also imply that on-time performance affects a carrier's market share primarily through the passengers' experience, and not though the "advertisement" of performance.

Airline Finance (2021):

Author:Peter.S.Morel

The researcher in this articlecited that, It is supportedat each stage by practical airline examples and recent data, *Airline Finance* examines the financial trends and longer term prospects for the airline industry as a whole, contrasting the developments for themajor regions and airlines together with critical discussion of key issues that affect the industry as a whole. Important techniques in financial analysis are applied to the airlines as well as their investors such as banks and other financial institutions. This book iswritten for employees of airlines, airports and their suppliers, and investment bank and other analysts. It is also popular for use by universities and in-house courseson air transport management, withinboth academia and industry.

Airline Route Profitability Analysis And Optimization Using Big Data Analytics On Aviation Data Sets Under Heuristic Techniques (2016):

Authors: Kasturi E, Prasanna Devi Sb, Vinu Kiran Sb,ManivannanSc

Researchers in this article cited that, applying vital decisions for newairline routes and aircraft utilization are important factors for airline decision making. For data driven analysiskey points such as airliners route distance, availability on seats/freight/mails and fuel are considered. The airline route profitability optimization model is proposedbased on performing Bigdata analytics over large scale aviation data under multiple heuristic methods,based on which practical problemsare analyzed. Analysis should be done based on key criteria, identified by operational needs and load revenues from operational systems e.g. passenger, cargo, freights, airport, country, aircraft, seat class etc. The result shows that the analysis is simple andconvenient with concrete decision.

Analysis Of Flight Data Using Clustering Techniques For Detecting Abnormal Operations(2015):

Author:Lishaui Li,Santanu Das

The researcher in this article cited that,the airline industry is movingtowardproactive risk management, which aims to identify and mitigate risks before accidents occur. However, existing methods forsuch efforts are limited. Theyrely on predefined criteriato identify risks,leaving emergent issues undetected. This paper presentsa newmethod, cluster-based anomaly detection to detect abnormalflights, which can support domainexperts in detectinganomalies and associated risks from routine airline operations.The new method, enabledby data from the flightdata recorder, applies clustering techniques to detect abnormal flights of unique data patterns. Comparedwith existing methods,the new method no longerrequires predefined criteria or domain knowledge. Tests were conducted usingtwo sets of operational data consisting of 365 B777 flightsand 25,519A320 flights.The performance of cluster-based anomalydetection to detect abnormal flights was compared with those of multiplekernel anomaly detection, which is another data-driven anomaly detection algorithmin recent years, as well as with exceedance detection, whichis the currentmethod employed by the airline industry. Results showed that both cluster-based anomalydetection to detect abnormal flights and multiple kernel anomaly detection were able to identify operationally significant anomalies,surpassing the capability of exceedance detection. Cluster-based anomaly detectionto detect abnormalflights performed better with continuous parameters, whereas multiple kernelanomaly detection was more sensitivetowarddiscrete

parameters.

Data AnalyticsOf Skytrax's AirportReviewAnd Ratings(2015):

Author:KrityaBunchongchit

The researcher in this articlecited that, this study investigates the perception of passengers of airport service attributes, using data from the SkytraxAirport Review websites.Overall, a total of 7358 reviews were collected from the website,together with other related passenger data, namely review headers, passenger types, rating scores of airport attributes and the overall rating. This study focused on investigating each group of passenger types to identify underlying differences amongst airport's passenger segmentation, particularly on the leisure travelers. The study performeddifferent techniques of data analysisincluding sentiment analysis,lemmatization and partialleast square – structural equationmodelling (PLS-SEM) to reveal key patterns derived from the available data, which the normal survey data or the interview data may not have revealed.The research contributes to airport passenger segmentation by highlighting the differences found in the travelers segmented by Skytrax. The study also provides practical implications to airport managers

Post Pandemic Aviation Market Recovery:Experience and lessons from China(2021)

Author:Achim.I.Czemy

The researcher in this article cited that, China was the first aviationmarket in the world hit hard by COVID-19 and has been recovering gradually as the pandemic became largely under control within mainland China. This study reviews the recovery pattern influenced by the Chinese government's aviation policy choices, in the hope that our discussions and findings will help improve aviation policy responses elsewhere. While the domestic market in mainland China has enjoyed a quick recovery to about 80% of the pre-crisis level by July 2020, the recovery of international services has been much slower, due to the bilateral route and flight frequency/capacity control and strict requirements for health check and quarantine. China's domestic aviation market was recovered by about 80% in two months after the pandemic became under good control. Most other countries with a “curve flattening” strategy, instead of full pandemic control, may not expect the fast recovery path China has achieved. A British “travel corridor” approach may be more practical for Westerncountries to follow,albeit more likelyto be subject toserious setbacks and disruptions. The aviation fee reductions and cost support China and many other countries have been using are helpful by reducing airlines' marginalcosts, but not sufficient for carriers to return to profitability or sustainable operations. Capital injection and/or credit guarantee may be needed for many airlines to survive. With various, often uncoordinated, regulations imposed in international markets, airlines based in open economies that have small domestic markets will face

particularly serious challenges during the recovery process.

Sustainability Reporting In The AirlineIndustry:Current Literature And FutureResearch Avenues(2022):

Authors: Malgorzata Zieba and Eljas Johansson

Researchers in this article cited that, sustainability reporting (SR) allows organizations to communicate their non-financial impacts to stakeholders. It has also become a widespread business practice in aviation, a transport sector that contributes significantly to global warming. Academia has begun to examine SR in the context of airlines surprisingly late, and no comprehensive reviews of its respective developments have been made so far. Consequently, a systematic literature review was performed with an exclusive focus on airline SR to synthesize its associated scholarly researchand distinguish the common concerns and gaps that have emerged from it. The analyzed publications indicate that the industry has lacked a unified policy and common understanding of how to define and measure sustainability, which has led to inconsistent SR practices. This causes ambiguity betweenthe real actionsand promotional communication through which airlinesmay legitimize their operations. Academia and various airline stakeholders would benefit from more in- depth studies examining the stakeholder views and quality of disclosures, helping the industryimprove itS SR.

Problem Statement Definition:

To identify and manage many people travelingthis summer, they are noticingfirst –hand that airlines are facing major challenges, including numerous flight cancellations and delays.

Who does the problem affect?	Many people will get frustrated to sitidle in airport. Passengers who need tohandle international meeting and also for someemergency purpose.
What are the boundaries of the problem?	Adverse weather conditions, low ceilings, and low visibility conditions strongly influence flight delays.
What is the issue?	Inclement weather, such as thunderstorm, hurricane, or blizzard.Late arrival of the aircraft to be usedfor the flight from a previous flight. Maintenance problems with theaircraft.
When does the issue occurs?	A flight delay is when an airline flight takes off and /or lands later than its scheduled time. A cancellation occurs when the airline does not operate the flightat all for a certainreason.
Where is the issue occurring?	The least punctual airline of all U.S. carriers was Frontier which had an average on-time arrival of 73.14 percent.Coming in just above that was JetBlue with an on-timearrival of 73.5 percent.

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Project Flow:

- Users create multiple analytical graphs/charts/Visualizations.
- Using the Analytical Visualizations, build the required Dashboard(s)
- Saving and visualizing the final dashboard in the IBM Cognos Analytics.

To accomplish this, we have to complete all the activities and tasks listed below:

- IBM Cloud Account
- Login to Cognos Analytics
- Working with the Dataset

    >>Understanding the Dataset

    >>Loading the Dataset

- Data Visualization Charts

    <>Build the following visualizations

    1. Pie Chart - Continent-wise No. of Flights
    2. Packed Bubble Chart - Continent wise No. of Flights by Type - Colored with Type
    3. Continent List - Filter
    4. Top 10 Countries by Flights
    5. Countries - Summary Card
    6. Regions - Summary Card
    7. Airports - Summary Card
    8. Municipalities - Summary Card

9. Column Chart - Continent-wise No of Flights

10.Waterfall-Chart - Continent-wise No of Flights

11.Geo-Map - Continent-wise No. of flights

12.Geo-Map - Country-wise No. of flights

13.Continent Filter

14.Flight-Type filter

15.Column-Chart - No of Airports by Type

16.Hierarchy Bubble Chart - Region-wise Different Types of Airports

17.Packed bubble Chart - Municipality-wise No. of Airports

18.Bar Chart - Continent-wise No of Airport

Ideation& Brainstorming :

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	1. With the growing demand for air transportation and the limited ability to increase capacity at some key points in the air transportation system, there are concerns that inthe future thesystem will not scale to meet demand. This situation will result

		in the generation andthe propagation of delays throughout the system, impacting passengers' qualityof travel and more broadly the economy.
2.	Idea / Solution description	1. Understanding traveler demand for specific city pairs and pricing flights can be done using data analytics project. 2. Airlines use this biometric technology as a boarding option. The equipment scans travelers' faces and matches them with photosstored in border control agency databases. These can be handled withthe aforementioned project.

3.	Novelty / Uniqueness	1. The ultimate benefits of big data analytics include timelyresponses to currentand future marketdemands, improved planning and strategically aligned decision making, as

		well as crystal clear comprehension and monitoring of all main performance drivers relevant to the airline industry. 1. Due to the use of smart data analytics, passengers will avoidmany issues with baggage tracking. While radio-frequency identification prevents mishandling the baggage, predictive analysis assists in improving the predictability of fleetreliability.

4.	Social Impact / Customer Satisfaction	1. Data analytics helps the industry to understand customers' preferences and othermaintenance issues. 2. For instance, analysis of ticket booking helps the industry to target the customers with personalized offers while optimizing the price in real-timeusing predictive analysis techniques. As a result, by gathering meaningful data, airlines can fetch morebookings in the given timeframe.
5.	Business Model (Revenue Model)	1. Business models innovation in airlines can contribute to the creation ofvalue, competitive advantage and profitability with new possibilities of action. 2. A revenue modelis a

		blueprint that shows how a startup business will earn revenue or gross income from its standard business operations, and how it will pay for operating costs and expenses.
6.	Scalability of the Solution	1. The Cloud Cognos Analytics is not only for particular organization/governments. 2. Aviation industry acting under international, domestic or private are alsogetting satisfied with the aviation data analyzing processprovided as per their needs.

REQUIREMENT ANALYSIS:

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	customer Registration	customer can make Registeration through Gmail
FR-2	User Confirmation	After the Registeration the customer will get confirmation through mail.
FR-3	Visualizing data	User can visualize the Regular trends of delay of flights Using IBM cognos Analytics
FR-4	Generating Report	User can view the flight delay report

Non-functional Requirements:

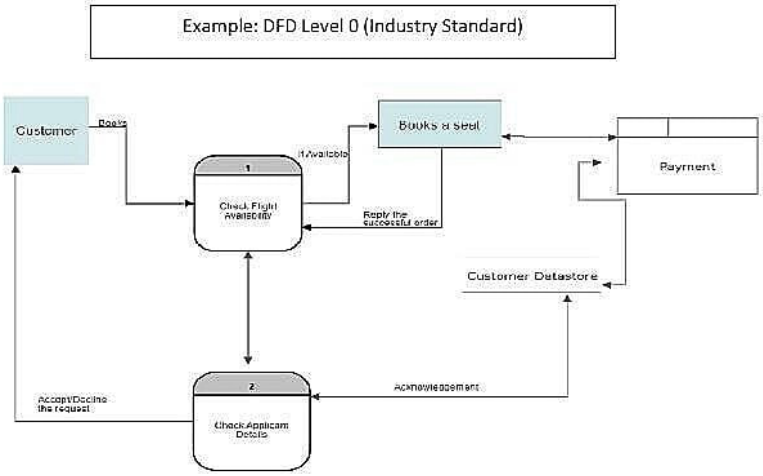
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The application will have a simple and user-friendly graphical interface. Users will be able to understand and use all the features of the application easily. Any action has to be performed with just a few clicks
NFR-2	**Security**	The main security concern is for users account hence proper login mechanism should be used to avoid hacking. The organization system should not disclose personal information of users and other organization details to public.
NFR-3	**Reliability**	When the system is disconnected or frozen due to over access at the same time, it should save all the process of the users made up to the point of abnormal happenings.
NFR-4	**Performance**	The system should require a fair amount of speed especially while browsing through the catalogue.
NFR-5	**Availability**	The system shall be available 24 hours a day 7 days a week. User can access at anytime.
NFR-6	**Scalability**	Large Number of users can access the website

PROJECT DESIGN:

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

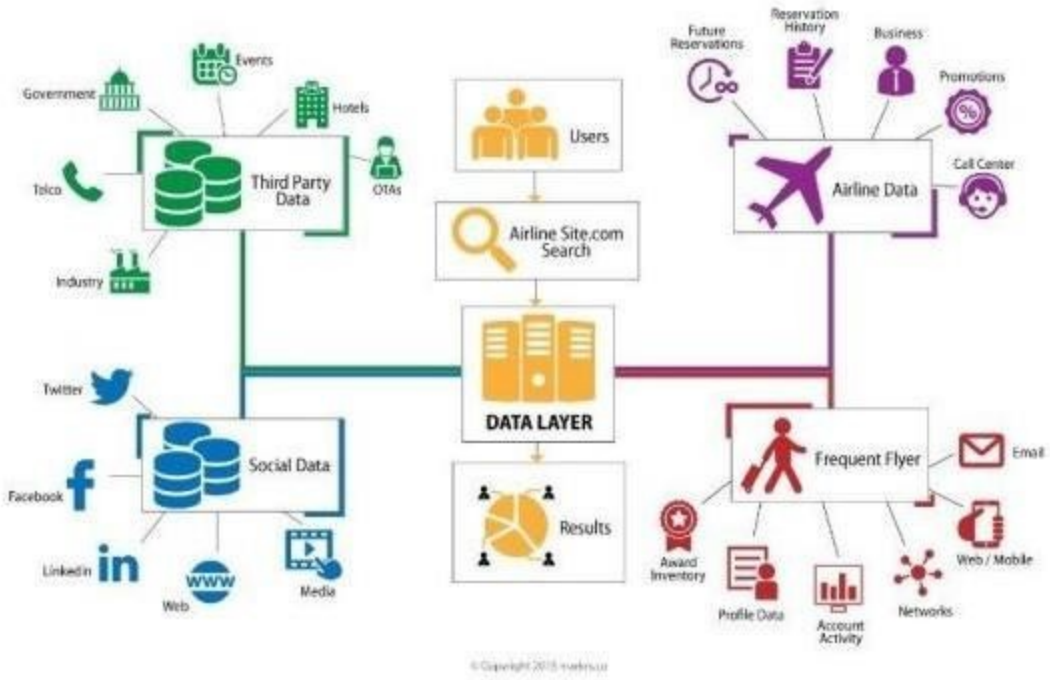


SOLUTION & TECHNICAL ARCHITECTURE:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table2.

Example:

Airline Data Analytics For Aviation Industry



User Stories :

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Gmail.		Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering email & password.	I can get to access my web portal	High	Sprint-1
	Dashboard	USN-5	As a user, I can get to know what my dashboard consists of.	I can my details of my registration.	Low	Sprint-2
Customer Care Executive	Organization	USN-6	The organization which owns this airplane analysis system will enable the option to customers to reach out the organization if • they have any problem with the organization's system of customer interaction or • airplane issues- delay, landing in a different location	The customer care workers will help out the customers in trouble.	High	Sprint-1
Administrator	Administration	USN-7	The organization takes in-charge of the administrative policies of different departments like: • registration • flight booking • delay visualization • generation of delay report	As an administrator, confirmation of user while registration is done.	High	Sprint-1

WORKING WITH THE DATASETS AND DATAVISUALISATION:

Working with the Dataset:

a. Understand the Dataset
b. Load theDataset
c. PerformJoins of the Dataset tables

Understanding the Dataset:

The data can be downloaded from the Links:

1. AirStats_data_on_airportsaround the_world
2. Circum_-_Airport_Performance_Reports
3. Resources_Coveragedata

2. Airports.csv

#	Field Name	DataType
1	id	Int
2	ident	Text
3	type	Text
4	name	Text
5	latitude_deg	Geo
6	longitude_deg	Geo
7	elevation_ft	int
8	continent	Text
9	iso_country	Text
10	iso_region	Text
11	municipality	Text
12	scheduled_service	Boolean
13	gps_code	Text
14	iata_code	Text
15	local_code	Text
16	home_link	Text
17	wikipedia_link	Text
18	keywords	Text

a. Countries.csv

#	Field Name	Type
1	id	Int
2	code	Text
3	name	Text
4	continent	Text
5	wikipedia_link	Text
6	keywords	Text

b. Regions.csv

#	Field Name	Type
1	id	Int
2	code	Text
3	local_code	Text

4	name	Text
5	continent	Text
6	iso_country	Text
7	wikipedia_link	Text
8	keywords	Text

RESULTS:

Performance Metrics:

Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S. No.	Parameter	Screenshot / Values
1.	Dashboard design	No of Visualizations / Graphs - 18
2.	Data Responsiveness	Itshows the output when anyof the dataset is selected.
3.	Utilization of Data Filters	Various filter methods were used to filter the dataset values like sort top or bottom format data etc..,
4.	Effective User Story	No of tabsAdded - 5
5.	Descriptive Reports	No of Visualizations / Graphs -18

ADVANTAGES & DISADVANTAGES:

Advantages:

a. It improves the average turnaround time needed to cater to market trends

b. Properly implemented data modules help flight operatorsbag more customersand profits

c. Predictive analytics is the key to preparing for future crises and put a mitigation plan inplace

d. It helps businesses make data-backed and more informedpolicy decisions

1. Not just sales and customer service, data analytics play a vital role in flight operationsandmaintenance too

Disadvantages:

- Air transport is a costlyservice. Its operational costs are too high. Middleclass andpoor people cannotaffect its cash.
- Air transportis prone to accidents. A small mistakecan be very dangerous forpassengers. Hijackingof planes is easily possible.
- For creating aviation facilities, huge investments are required. The cost of aero planes,construction and maintenance of aerodromes and control mechanism needs a capital expenditure.

APPENDIX:

Source Code:

Source code for Login Page:

```
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-
    scale=1.0">
    <title>Login Form</title>
    <link rel="stylesheet" href="style.css">
    <link rel="stylesheet" href="C:\Users\PC\OneDrive\Desktop\style.css"
    />
</head>

<body>
    <div class="wrapper">

        <header>Login Form</header>
        <form      action="https://zesty-duckanoo-d543d0.netlify.app/">
            <div class="field email">
                <div class="input-area">
                    <input type="text" placeholder="Email Address">
                    <i class="icon fas fa-envelope"></i>
                    <i class="error error-icon fas fa-exclamation-
circle"></i
>           </div>
                    <div class="error error-txt">Email can'tbe blank</div>
            </div>
            <div class="field password">
                <div class="input-area">
                    <input type="password" placeholder="Password">
                    <i class="icon fas fa-lock"></i>
```

```
                        <i class="error error-icon fas fa-exclamation-
circle"></i
>           </div>
                    <div class="error error-txt">Password can'tbe blank</div>
                </div>
                <div class="pass-txt"><a href="#">Forgot password?</a></div>

                <input type="submit" value="Login">
            </form>
            <div class="sign-txt">Not yet member? <ahref="#">Signup
now</a></div>
        </div>

        <script src="script.js"></script>

</body>

</html>
```

Source code for Dashboardpage:

```
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="utf-8">
    <meta content="width=device-width, initial-scale=1.0" name="viewport">

    <title>AIRSTATS DASHBOARD</title>
    <meta content="" name="description">
    <meta content="" name="keywords">

    <!-- Favicons-->
    <link href="assets/img/favicon.png" rel="icon">
    <link href="assets/img/apple-touch-icon.png" rel="apple-touch-icon">

    <!-- GoogleFonts -->
    <link
href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,600
,600i,700,700i|Montserrat:300,400,500,700"     rel="stylesheet">

    <!-- Vendor CSS Files -->
    <link href="assets/vendor/aos/aos.css" rel="stylesheet">
    <link href="assets/vendor/bootstrap/css/bootstrap.min.css"
rel="stylesheet">
    <link  href="assets/vendor/bootstrap-icons/bootstrap-icons.css"
rel="stylesheet">
    <link       href="assets/vendor/glightbox/css/glightbox.min.css"

rel="stylesheet">
    <link href="assets/vendor/swiper/swiper-bundle.min.css" rel="stylesheet">
```

```
    <!-- TemplateMain CSS File -->
    <link href="assets/css/style.css" rel="stylesheet">

    <!--      =======================================================
```

1. Template Name: NewBiz - v4.9.1
2. Template URL: https://bootstrapmade.com/newbiz-bootstrap-business-template/
3. Author: BootstrapMade.com
4. License: https://bootstrapmade.com/license/

```
    =======================================================      -->
</head>

<body>

    <!-- =======Header ======= -->
    <header id="header" class="fixed-top d-flex align-items-center">
        <div class="container d-flex justify-content-between">

            <div class="logo">
                <!-- Uncomment below if you prefer to use an text logo -->
                <h1><a href="index.html">Airlines DataAnalytics for Aviation Industry</a></h1>

            </div>

            <nav id="navbar" class="navbar">
                <ul>
                    <li><a class="nav-link scrollto active" href="#hero">Home</a></li>

                    <li><a class="nav-link scrollto" href="#services">Dashboard</a></li>

                    <li><a class="nav-link scrollto" href="#contact">Contact</a></li>
                </ul>
```

```
            <i class="bi bi-list mobile-nav-toggle"></i>
          </nav><!-- .navbar-->

        </div>

    </header><!-- #header-->

  <!-- =======Hero Section =======-->
  <section id="hero" class="clearfix">
    <div class="container" data-aos="fade-up">

        <div class="hero-img" data-aos="zoom-out" data-aos-delay="200">
          <img src="assets/img/hero-img.svg" alt="" class="img-fluid">
        </div>

        <div class="hero-info" data-aos="zoom-in" data-aos-delay="100">
          <h2>AIRLINES<br><span>DATA ANALYTICS</span><br>FOR
AVIATIONINDUSTRY</h2>
          <div>
            <a href="#services" class="btn-services scrollto">View Dashboard</a>
          </div>
        </div>

    </div>
</section><!-- End Hero Section-->

    <main id="main">



        <!-- =======Services Section =======-->
        <section id="services" class="section-bg">
          <div class="container" data-aos="fade-up">
            <header class="section-header">
```

```
                <h3>AIRSTATS ANALYSIS DASHBOARD</h3>
                <iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef=.
my_folders%2FAIR%2BSTATS%2BDASHBOARD&amp;closeWindowOnLastVie
w=true&amp;ui_ap
pbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&a
mp;mod e=dashboard&amp;subView=model0000018447f5966e_00000002"
width="1300" height="1000" frameborder="0" gesture="media" allow="encrypted-
media" allowfullscreen="">
                </iframe>
            </header>
        </div>
    </section><!-- End Services Section-->



    <!-- =======Contact Section ========-->
    <section id="contact">
        <div class="container-fluid" data-aos="fade-up">
            <div class="section-header">
                <h3>Contact Us</h3>
            </div>
            <div class="row">
                <div class="col-lg-6">
                    <div class="row">
                        <div class="col-md-5 info">
                            <i class="bi bi-geo-alt"></i>
                            <p>GCE TLY</p>
                        </div>
                        <div class="col-md-4 info">
                            <i class="bi bi-envelope"></i>
                            <p>https://github.com/capnpeace.com</p>
                        </div>
                </div>

            </div>
```

```
            </div>
        </section><!-- End Contact Section-->

    </main>
    <!-- End #main -->



    <a href="#" class="back-to-top d-flex align-items-center justify-content-center"><i class="bi bi-arrow-up-short"></i></a>

    <!-- VendorJS Files -->
    <script src="assets/vendor/purecounter/purecounter_vanilla.js"></script>
    <script src="assets/vendor/aos/aos.js"></script>
    <script src="assets/vendor/bootstrap/js/bootstrap.bundle.min.js"></script>
    <script     src="assets/vendor/glightbox/js/glightbox.min.js"></script>
    <script   src="assets/vendor/isotope-layout/isotope.pkgd.min.js"></script>
    <script  src="assets/vendor/swiper/swiper-bundle.min.js"></script>

      <script  src="assets/vendor/php-email-form/validate.js"></script>

      <!-- TemplateMain JS File -->
      <script src="assets/js/main.js"></script>

  </body>

  </html>
```

SoftwareRequirement & Specification:

- IBM Cognos
- GitHub

- JIRA
- Google Collaborator
- Google Drive
- Notepad
- MS Excel
- JavaScript
- Python
- CSS

CONCLUSION:

Flight delays are a major problem in civil aviation. They incur direct and indirectcosts, such as maintenance at the gate, extra fees for crew, food service, and lodging. They also affect passenger satisfaction. Flight delay is inevitable and it plays an important role in both profits and losses of the airlines. An accurate estimation of flight delay is critical for airlines because the results can be applied to increase customer satisfaction and the incomes of airline agencies. So, the prediction and analysis of flight delays are of great significance to airlines,passengers, and airports. Predicting delays will help an airport to adjust resource allocations, quicklyanalyze the causes,and take measuresto reduce or eliminate delays.Therefore, it delivers a well-friendly graphical UI and gives a proper delay rate tothe users.

FUTURE SCOPE:

To illustrate, airlines bear high costs due to delays and cancellations that includeexpenses on maintenance and compensations to travelers stuck in airports. With nearly 30 % of the total delay time caused by unplanned maintenance, predictive analyticsapplied to fleet technical supportis a reasonable solution.