LRG ARTS COLLEGE FOR WOMEN, TIRUPUR

DEPARTMENT OF MATHEMATICS

Course Name: Data Analytics with Tableau

Academic Year: 2023 – 2024

A project report entitled as

"Unlocking Insights into the Global Air Transportation Network with Tableau"

Work done by

University Ro	Naan Mudhalvan ID	Name	Department
2122A0090	A8410E2D337F4ADB4BF4B3E34AFC4EC0	SANTHAMANI R	B.Sc. Mathematics
2122A0092	B20F63491D948138EE4422AA29E7F8B7	SASIKALA K	B.Sc. Mathematics
2122A0065	37D08E84EF59CDA9D0F4391459639A09	SHAHEENA R	B.Sc. Mathematics
2122A0093	C7CC3BAE0B167F7B5FE4E5833DFCABBD	SOWMIYA N	B.Sc. Mathematics

Team ID: NM2023TMID01976

Under the guidance of

Mr. S. ANANDHAKUMAR

Guest lecturer

Department of Mathematics

L.R.G. ATRS COLLEGE FOR WOMEN

UNLOCKING INSIGHTS INTO THE GLOBAL

AIR TRANSPORTION NETWORK WITH TABLEAU

1.INTRODUCTION

1.1 Overview

Unlocking insights into the global air transportation network involves a data-driven exploration of the vast and interconnected world of aviation.

To gain insights, we gather data from various sources, including flight schedules, passenger records, cargo manifests, airport information, weather data, and more. The collected data is cleaned, structured, and prepared for analysis. This includes handling missing data, standardizing formats, and ensuring data. Analyzing safety records and incidents is crucial for highest safety standards in the aviation industry Analyzing safety records and incidents is crucial highest safety standards in the aviation industry Airlines can use these insights to the flight routes, schedule, leading to cost reductions and improved service. Understanding passenger data helps enhance the travel experience through tailored services and marketing strategies.

Analyzing safety records and incidents is crucial for maintaining the highest safety standards in the aviation industry. By analyzing the economic impact of air transportation, governments and organizations can make informed decisions on investments and policies. Insights drive innovation and research in aviation, guiding decisions on aircraft design, technology, and sustainability. Unlocking insights into the global air transportation network with Tableau enables stakeholders to make informed decisions, improve operational efficiency, enhance passenger experience, and ensure safety and sustainability in this essential industry. It empowers us to navigate the skies more efficiently and securely, connecting people and goods across the world.
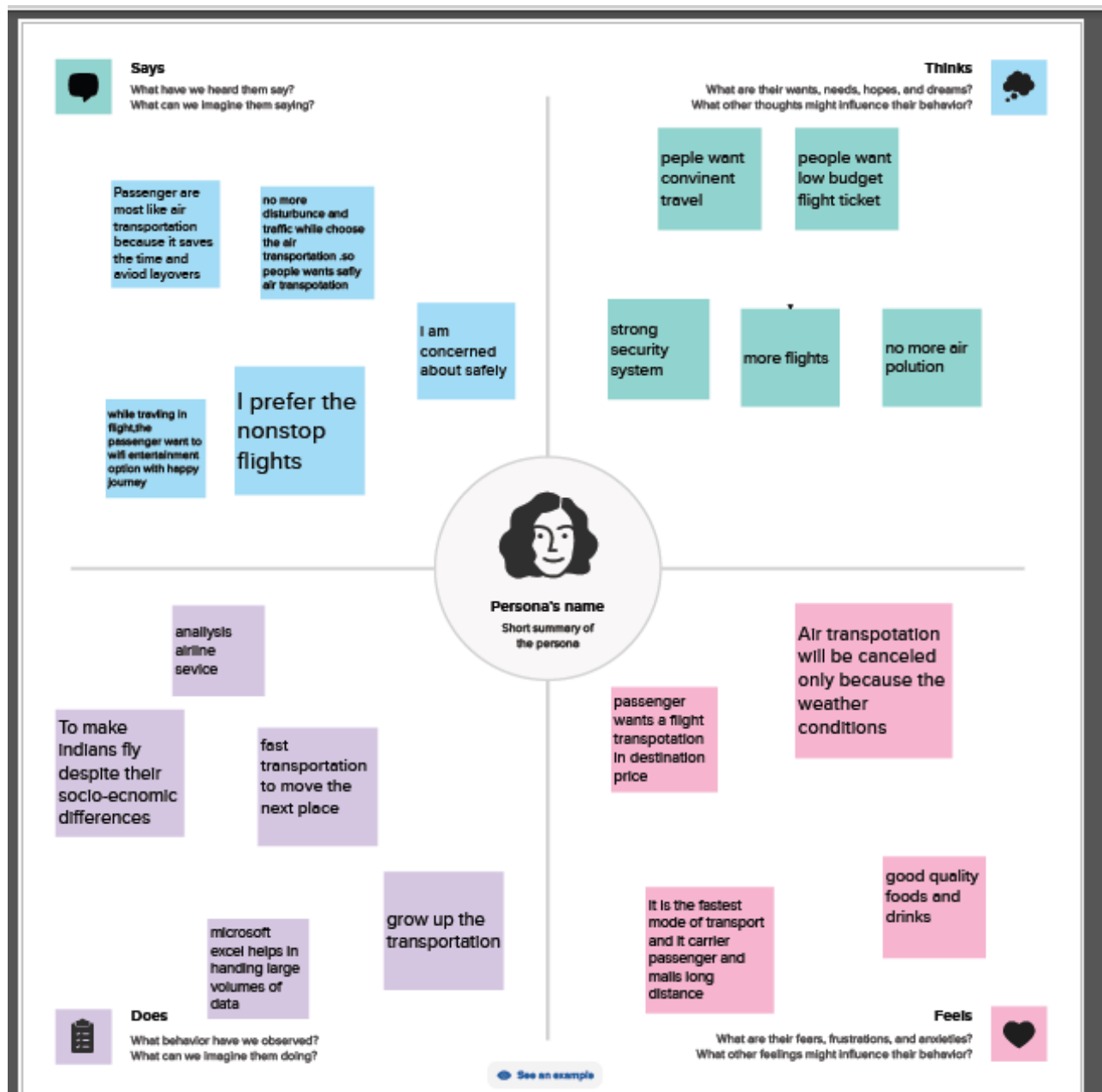
1.2 Purpose

The purpose of analyzing the global air transportation network with Tableau is to gain valuable insights and make data-driven decisions in various domains, such as aviation, tourism, and government Polic Airlines can use Tableau to track flight routes, passenger loads, and on-time performance to optimize operations, reduce delays, and improve efficiency Airlines and airports can use Tableau to identify profitable routes, understand passenger demand, and plan new routes or adjust existing ones Tableau helps airlines understand passenger demographics, preferences, and behaviors, allowing for personalized marketing and service improvements. Government agencies and aviation authorities can use Tableau to check safety and security data, and safety compliance.

Governments and organizations can analyze the economic impact of the aviation industry on a regional or global scale, considering job creation and revenue generation. Understand travel patterns to promote tourism, such as showing popular destinations and understanding the seasonality of travel. Airlines and organization companies can use Tableau to perfect cargo routes, track shipments, and ensure the efficient movement of Goodtimes of pandemics or health crises, Tableau can be used to track passenger health data and assess safety measures. Ensure compliance with aviation regulations and standards, making sure that safety and operational protocols are   During natural disasters or emergencies, airlines, government agencies, and relief organizations can use Tableau to check and respond to transportation needs. Airlines and manufacturers can use data analysis to drive innovation in plane design, technology, and sustainability. Tableau allows stakeholders in the global air transportation network to visualize

and understand complex data, show trends, make informed decisions, and improve various aspects of the industry, ranging from operational efficiency to passenger experience and safety.

2.PROBLEM DEFINITION AND DESIGN THINKING

2.1 Empathy Map

2.2 Ideation & Brainstorming Mapping

3.RESULT

Dashboard 1

Dashboard 2
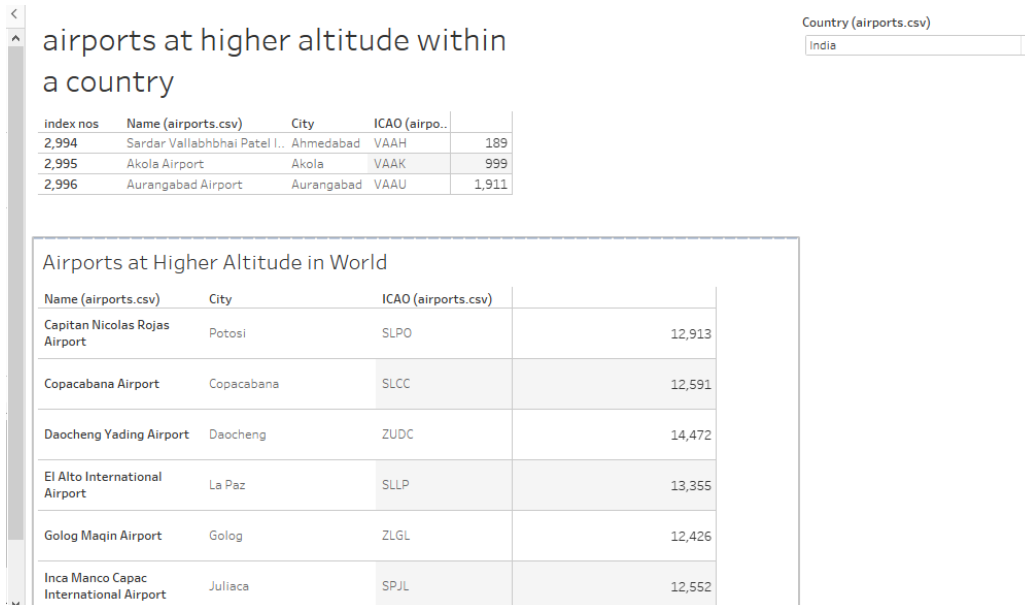
Dashboard 3

Airlines within a Country

Airline ID	Name	Icao	Callsign		
12	611897 Alberta Limited	THD	DONUT		■
17	Aero Aviation Centre Ltd.	AAD	SUNRISE		■
36	Angus Aviation	AAZ	ANGUS		■
44	Alberta Citylink	ABK	ALBERTA CITYLINK		■
61	Air Charters	ACX	PARAIR		■
82	Avion Taxi	ADQ	AIR DATA		■
85	Air Dorval	ADT	AIR DORVAL		■
87	Advance Air Charters	ADV	ADVANCE		■
91	Air Southwest Ltd.	ASW	AIRSOUTHWEST		■
107	Air Alma	AAJ	AIR ALMA		■
126	Air Fecteau	AFH	FECTO		■
134	Air Brasd'or	BRL	BRASD'OR		■
135	Air 500	BRM	BOOMERANG		■
140	Air Caledonia	ACM	WEST CAL		■
152	Air Sandy	SNY	AIR SANDY		■

Active
- ☑ (All)
- ☑ N
- ☑ Y

Country
Canada ▾

Active
- ■ N
- ■ Y

No of Airline
29

Country
India ▾

Sheet 2 Sheet 3 Sheet 4 Sheet 5 Sheet 6 ⊞ Dashboard 1 ⊞ Dashboard 2 Sheet 8 ⊞ Dashboard 3 ⊞ Dashboard 4 ⊞ Story 1 Sheet 9

Dashboard 4

Country with Maximum Number of Airports
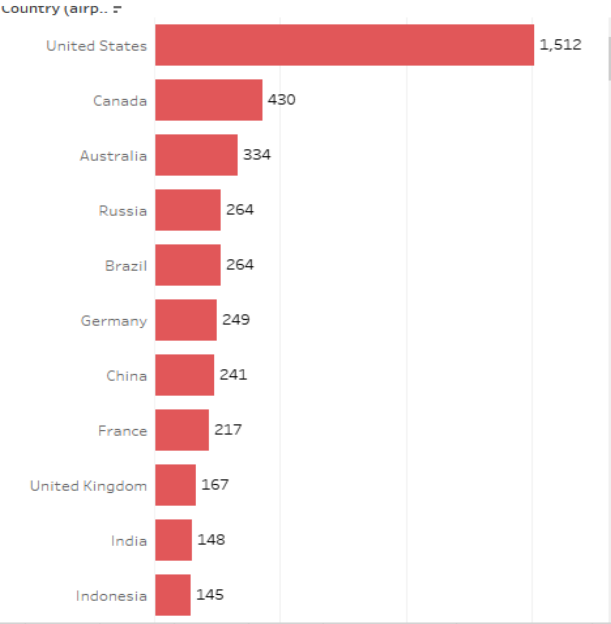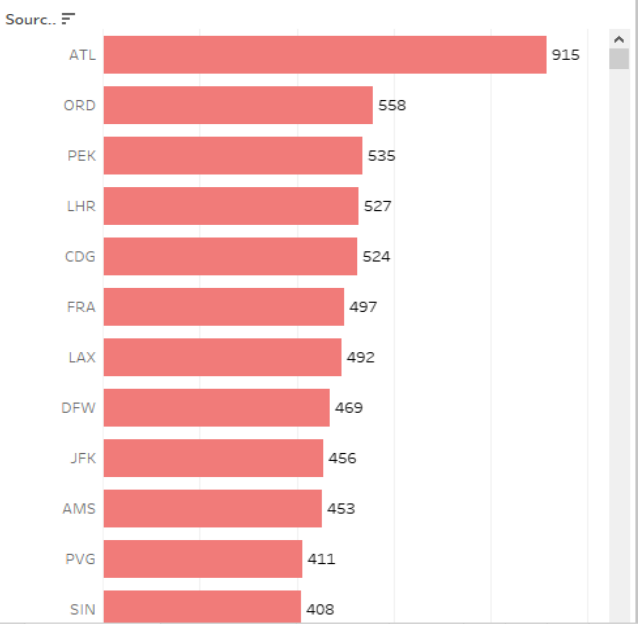
Country (airp.. ⊐

United States	1,512
Canada	430
Australia	334
Russia	264
Brazil	264
Germany	249
China	241
France	217
United Kingdom	167
India	148
Indonesia	145

Number of Flights from Airport

Sourc.. ⊐

ATL	915
ORD	558
PEK	535
LHR	527
CDG	524
FRA	497
LAX	492
DFW	469
JFK	456
AMS	453
PVG	411
SIN	408

STORY

Story 1

Sheet 1

Country (airports.csv)
India

number of airports

148

City
- Null
- Adampur
- Agartala
- Agatti Island
- Agra
- Ahmedabad
- Aizwal
- Ajmer

Story 1

airports at higher altitude within a country

Country (airports.csv)
Jamaica

index nos	Name (airports.csv)	City	ICAO (airpo..	
1,778	Boscobel Aerodrome	Ocho Rios	MKBS	90
1,779	Norman Manley Internati..	Kingston	MKJP	10
1,780	Sangster International Ai..	Montego Bay	MKJS	4

Airports at Higher Altitude in World

Name (airports.csv)	City	ICAO (airports.csv)	
Capitan Nicolas Rojas Airport	Potosi	SLPO	12,913
Copacabana Airport	Copacabana	SLCC	12,591
Daocheng Yading Airport	Daocheng	ZUDC	14,472

Story 1

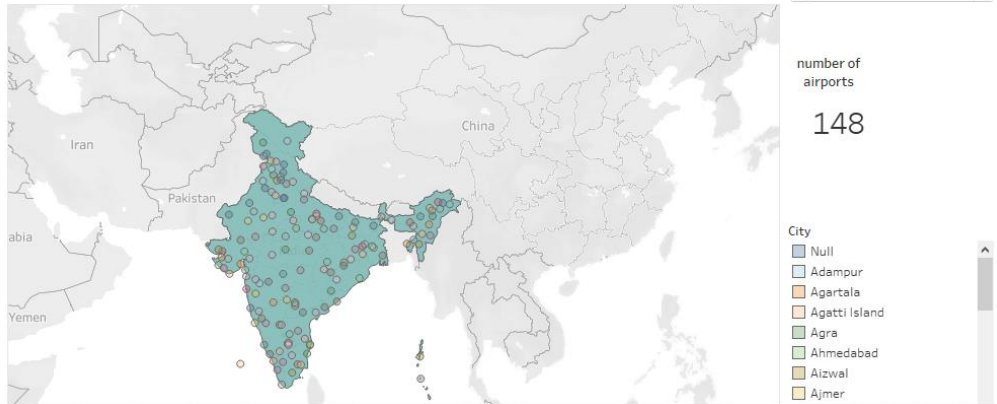World Map Showing Countries with details of Airports | Table showing Airports which are all Highest altitude in the world | Table showing list of All Airlines within the Country | Bar graphs showing Countries with Max No. of Airports and

Airlines within a Country

Active
- ☑ (All)
- ☑ N
- ☑ Y

Country
Canada

Active
- ■ N
- ■ Y

No of Airline

29

Country
India

Airline ID	Name	Icao	Callsign	
12	611897 Alberta Limited	THD	DONUT	■
17	Aero Aviation Centre Ltd.	AAD	SUNRISE	■
36	Angus Aviation	AAZ	ANGUS	■
44	Alberta Citylink	ABK	ALBERTA CITYLINK	■
61	Air Charters	ACX	PARAIR	■
82	Avion Taxi	ADQ	AIR DATA	■
85	Air Dorval	ADT	AIR DORVAL	■
87	Advance Air Charters	ADV	ADVANCE	■
91	Air Southwest Ltd.	ASW	AIRSOUTHWEST	■
107	Air Alma	AAJ	AIR ALMA	■
126	Air Fecteau	AFH	FECTO	■

Story 1

World Map Showing Countries with details of Airports | Table showing Airports which are all Highest altitude in the world | Table showing list of All Airlines within the Country | Bar graphs showing Countries with Max No. of Airports and

Country with Maximum Number of Airports

Country (airp... =

United States	1,512
Canada	430
Australia	334
Russia	264
Brazil	264
Germany	249
China	241
France	217

Number of Flights from Airport

Sourc... =

ATL	915
ORD	558
PEK	535
LHR	527
CDG	524
FRA	497
LAX	492
DFW	469
JFK	456
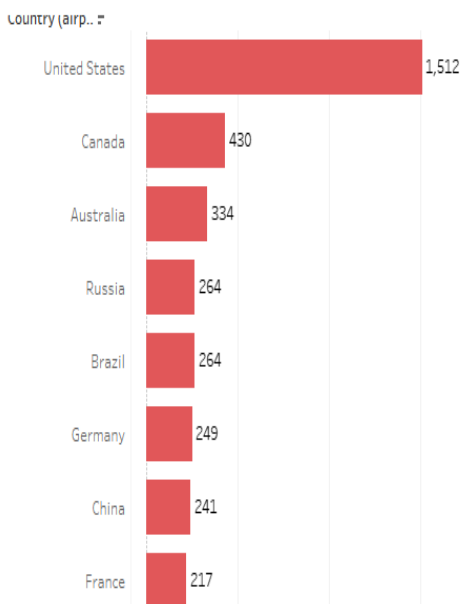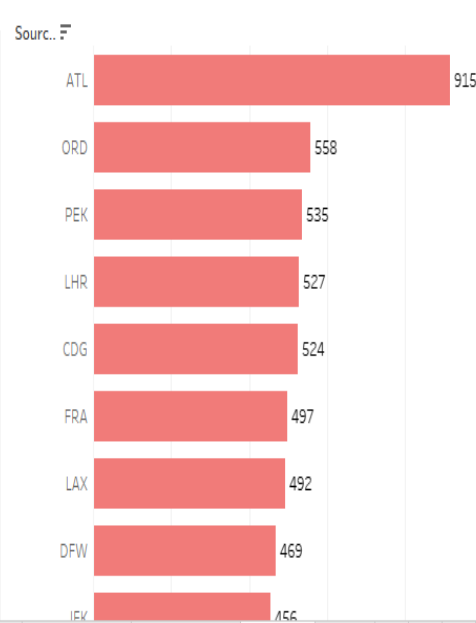
VISUALIZATIONS

1.World Map showing details of all airports within a country

2.Number of Airports

3.Airports at higher altitude within a country

airports at higher altitude within a country

Country (airports.csv)

India

index nos	Name (airports.csv)	City	ICAO (airpo..	
2,994	Sardar Vallabhbhai Patel I..	Ahmedabad	VAAH	189
2,995	Akola Airport	Akola	VAAK	999
2,996	Aurangabad Airport	Aurangabad	VAAU	1,911

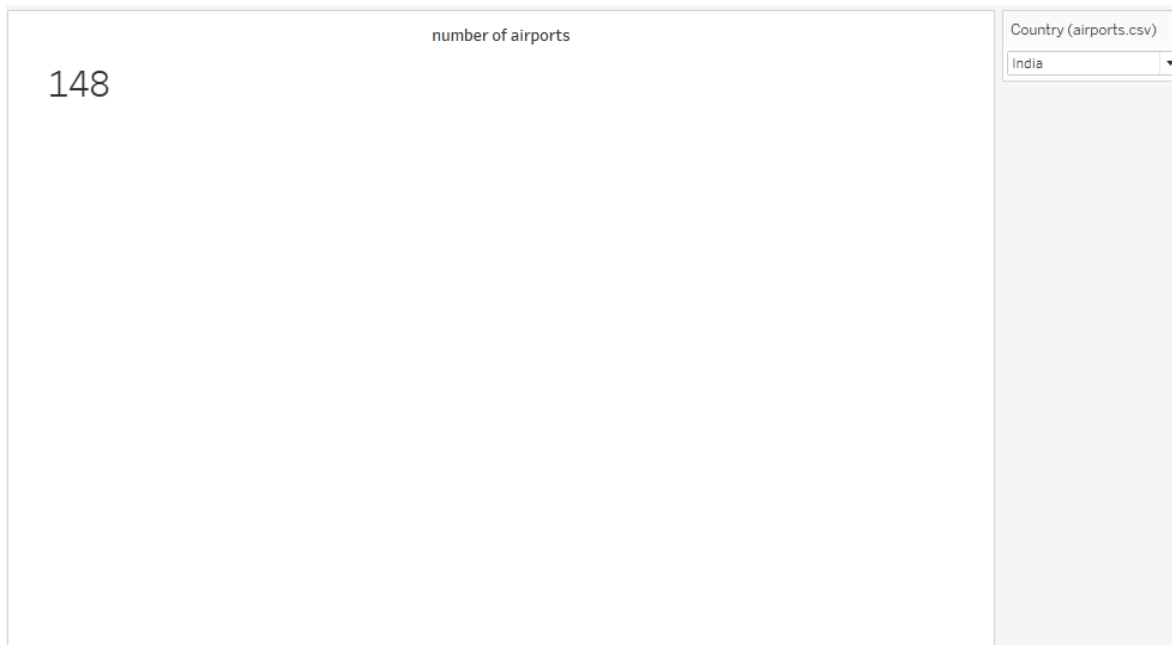## 4.Airports at higher Altitude in World

Airports at Higher Altitude in World

Name (airports.csv)	City	ICAO (airports.csv)	
Capitan Nicolas Rojas Airport	Potosi	SLPO	12,913
Copacabana Airport	Copacabana	SLCC	12,591
Daocheng Yading Airport	Daocheng	ZUDC	14,472
El Alto International Airport	La Paz	SLLP	13,355
Golog Maqin Airport	Golog	ZLGL	12,426
Inca Manco Capac International Airport	Juliaca	SPJL	12,552
Kangding Airport	Kangding	ZUKD	14,042
Ngari Gunsa Airport	Shiquanhe	ZUAL	14,022

5.Airlines within a Country

Airlines within a Country

Airline ID	Name	Icao	Callsign	
12	611897 Alberta Limited	THD	DONUT	▪
17	Aero Aviation Centre Ltd.	AAD	SUNRISE	▪
36	Angus Aviation	AAZ	ANGUS	▪
44	Alberta Citylink	ABK	ALBERTA CITYLINK	▪
61	Air Charters	ACX	PARAIR	▪
82	Avion Taxi	ADQ	AIR DATA	▪
85	Air Dorval	ADT	AIR DORVAL	▪
87	Advance Air Charters	ADV	ADVANCE	▪
91	Air Southwest Ltd.	ASW	AIRSOUTHWEST	▪
107	Air Alma	AAJ	AIR ALMA	▪
126	Air Fecteau	AFH	FECTO	▪
134	Air Brasd'or	BRL	BRASD'OR	▪
135	Air 500	BRM	BOOMERANG	▪

Active
- ☑ (All)
- ☑ N
- ☑ Y

Country
Canada

Active
- ▪ N
- ▪ Y

6.Number of flights from Airport

Number of Flights from Airport

Sourc..

Airport	Count
ATL	915
ORD	558
PEK	535
LHR	527
CDG	524
FRA	497
LAX	492
DFW	469
JFK	456

Count of routes.csv

7.Country with maximum number of Airports

Country with Maximum Number of Airports

Country (airp..	no of airport
United States	1,512
Canada	430
Australia	334
Russia	264
Brazil	264
Germany	249
China	241
France	217
United Kingdom	
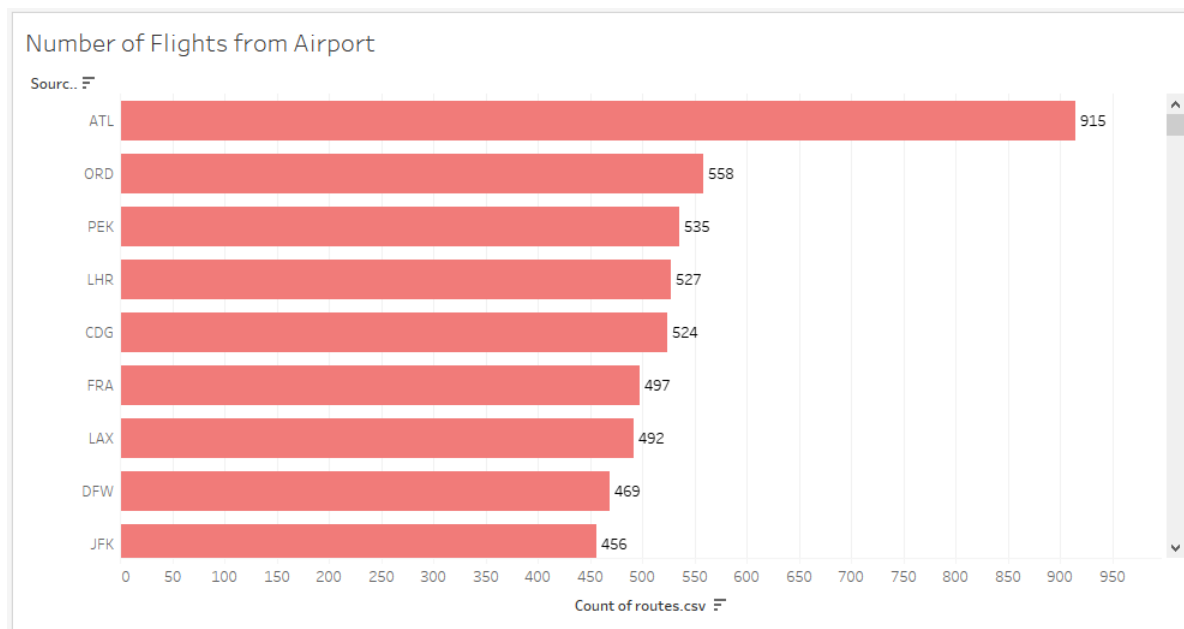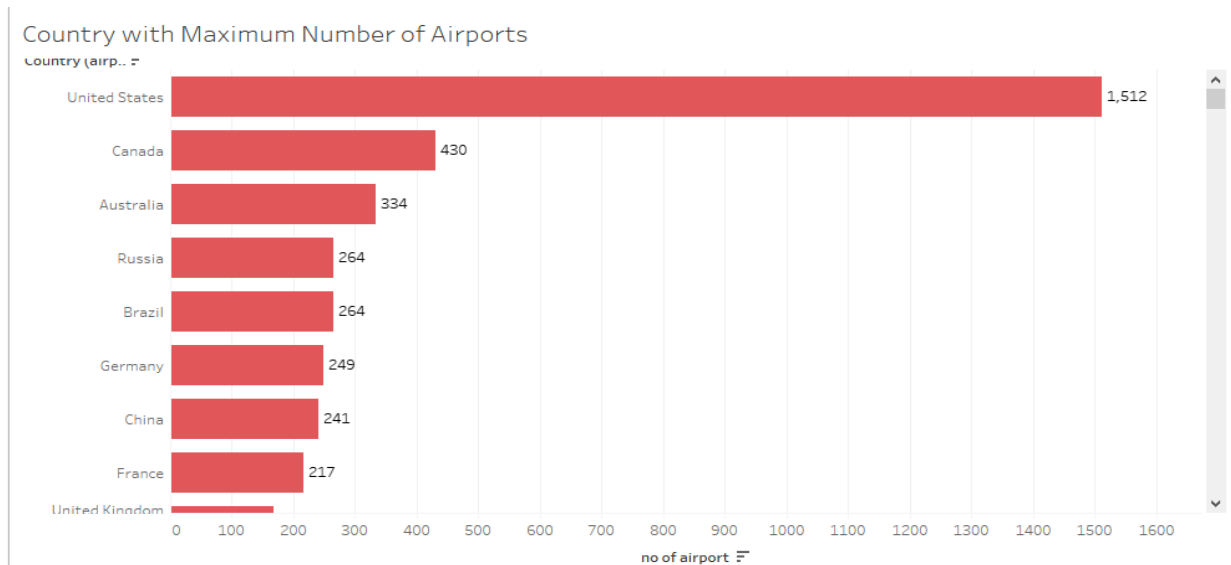
4. ADVANTAGES &DISADVANTAGES

4.1 Advantages

1. Tableau can be a powerful tool for unlocking insights into the global air transportation network. Its data visualization capabilities allow you to analyze and display complex data in an intuitive and interactive way.

2. Tableau can connect to various data sources, including databases, spreadsheets, and cloud-based data, allowing you to bring together diverse datasets related to air transportation.

3. useful for understanding trends, routes, and passenger data in the global air transportation networkable supplies mapping capabilities, making it easy to visualize routes, airports, and destinations across the globe.

4. You can create heatmaps and geographic visualizations to highlight patterns and connections. Tableau can be used to analyze real-time data, which is crucial in the dynamic field of air transportation.

5. You can track flight status, delays, and other real-time information. With Tableau's integration with advanced analytics tools, you can perform predictive analysis to forecast demand, perfect routes, and improve operational efficiency.
6.Tebleau offers robust security features, ensuring that sensitive data related to air

transportation make data-driven decisions to improve the industry's efficiency and safet

4.2 Disadvantages

 Unlocking insights into the global air transportation network with Tableau can be a valuable endeavor.

        1.Air transportation data is often complex, with multiple sources and formats. Integrating and preparing this data for analysis in Tableau can be time-consuming and require expertis.

        2. Tableau licenses and data storage costs can be significant, especially when dealing with large datasets. This cost can be a barrier for smaller organizations or projects.

        3. This can lead to a lack of collaboration and understanding among team members.

        4. Analyzing large datasets in   Tableau can sometimes lead to performance issues, particularly if the Hardware is not optimized.

5. Tableau is not as well-suited for real-time data analysis.

5.APPLICATIONS

1. Airlines and logistics companies can use Tableau to analyze historical flight data to optimize routes, reduce fuel consumption, and minimize travel time.

2. Airlines can use Tableau to understand passenger demand patterns, helping them schedule flights more effectively and improve revenue management.

3. Government aviation authorities can use Tableau to monitor and manage air traffic, ensuring safety and baggage handling processes, leading to better passenger experience.

4. Logistics companies can use Tableau to optimize the transportation of cargo by air, improving supply chain efficiency.

5.Researchers and consultants can use Tableau to analyze trends in the aviation industry and provide valuable insights to stakeholder

The world's top 5 airports of 2023

1. Singapore Changi

2. Doha Hamad

3.Tokyo Haneda

4.Seoul Incheon

5. Pairs CDG

The world's top 5 airlines of 2023

1. Singapore Airlines

2. Qatar Airways

3. ANA All Nippon Airways

4. Emirates

5. Japan Airlines

6.CONCLUSION

Unlocking insights into the global air transportation network using Tableau has proven to be a valuable endeavor. Through data visualization and analysis, we've gained a deeper understanding of the intricacies of this complex system. Key takeaways include:

By visualizing flight routes and passenger traffic, we can identify opportunities for airlines to optimize their routes, leading to cost savings and improved efficiency. Through historical data, we can uncover seasonal patterns in air travel, which can help airlines adjust their schedules and staffing accordingly.

Analyzing passenger demographics and travel preferences can aid airlines in tailoring their services to better meet customer needs and expectations. Visualizing the environmental impact of air travel can drive discussions about sustainability and guide efforts to reduce carbon emissions.

In conclusion, Tableau provides a powerful platform for unlocking these insights, and its use in analyzing the global air transportation network is critical for enhancing the industry's efficiency, sustainability, and customer satisfaction. This tool equips us to make data-driven decisions that will shape the future of air travel.

7.FUTURE SCOPE

The future scope of unlocking insights into the global air transportation network with Tableau is promising and multiple.

1. The integration of real-time data feeds into Tableau dashboards will become more prevalent, enabling airlines and airports to make immediate decisions based on current conditions, such as weather disruptions or flight del Advanced predictive analytics models can be incorporated to forecast passenger demand, optimize pricing, and anticipate maintenance needs, enhancing operational efficiency.

2.As data privacy and security concerns grow, Tableau will evolve to incorporate robust security features to protect sensitive information while still enabling data sharing and collaboration. With an increasing focus on sustainability, Tableau will play a role in tracking and visualizing environmental impact metrics, allowing stakeholders to monitor progress toward reducing carbon emissions.

3. Machine learning algorithms can be seamlessly integrated into Tableau for more intelligent data analysis, providing deeper insights into passenger behavior, route planning, and operational efficiency. Air transportation networks are global, and Tableau can facilitate international collaborations and data sharing among airlines, airports, and regulatory bodies to improve safety, security, and efficiency.

4.Tableau can be used to analyze customer feedback and satisfaction data to continuously improve the passenger experience, from booking to baggage claim. Beyond passenger travel, Tableau can be applied to optimize the entire air cargo supply chain, from tracking shipments to warehouse management.

5. Given the evolving nature of aviation regulations, Tableau will support airlines and airports in staying compliant with changing safety and security requirements. Tableau can be a valuable tool for training and educating aviation professionals, offering a dynamic way to teach safety procedures, air traffic management, and other critical aspects of the industry.

8.APPENDIX

GitHub Link:

https://github.com/bru07A0092/NM2023TMID01976

Dashboard 1:

https://public.tableau.com/app/profile/santhamani.r/viz/Dashboard1_16974186387070/Dashboard1?publish=yes

Dashboard 2:

https://public.tableau.com/app/profile/santhamani.r/viz/dashboard2_16973725156940/Dashboard2?publish=yes

Dashboard 3:

https://public.tableau.com/app/profile/santhamani.r/viz/Dashboard3_16974191906780/Dashboard3?publish=yes

Dashboard 4:

https://public.tableau.com/app/profile/santhamani.r/viz/Dashboard4_16974192968860/Dashboard4?publish=yes

Story 1:

https://public.tableau.com/app/profile/santhamani.r/viz/Story1_16974194145160/Story1?publish=yes

Video demonstration link:

https://drive.google.com/file/d/15Fk-GnmMYfi0RF1okRI_geoVCtIVc4Mm/view?usp=drivesdk