GOVERNMENT ARTS COLLEGE (AUTONOMOUS), COIMBATORE – 18.

DEPARTMENT OF PHYSICS

A PROJECT REPORT ON

UNLOCKING INSIGHTS INTO THE GLOBAL AIR TRANSPORTATION NETWORK WITH TABLEAU

BASED ON THE COURSE

FUNDAMENTALS OF DATA ANALYTICS WITH TABLEAU – SMARTBRIDGE

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SUBMITTED TO

NAAN MUDHALVAN – SMART INTERNZ

DATA ANALYTICS UPSKILL PROGRAMING

FUNDAMENTALS OF DATA ANALYTICS WITH TABLEAU - SMARTBRIDGE

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INTRODUCTION

1.1 OVERVIEW

Air transport network or air transportation network (ATN) is an example of transport networks and spatial networks. The nodes of the network are the airports and the links represent direct flight routes between two airports. Alternatively, cities can be considered as the nodes with links representing direct flight connection between them. Air transport networks can be defined worldwide as well as for one region or for one airline company; the scale of the network can be global or domestics.

1.2 PURPOSE

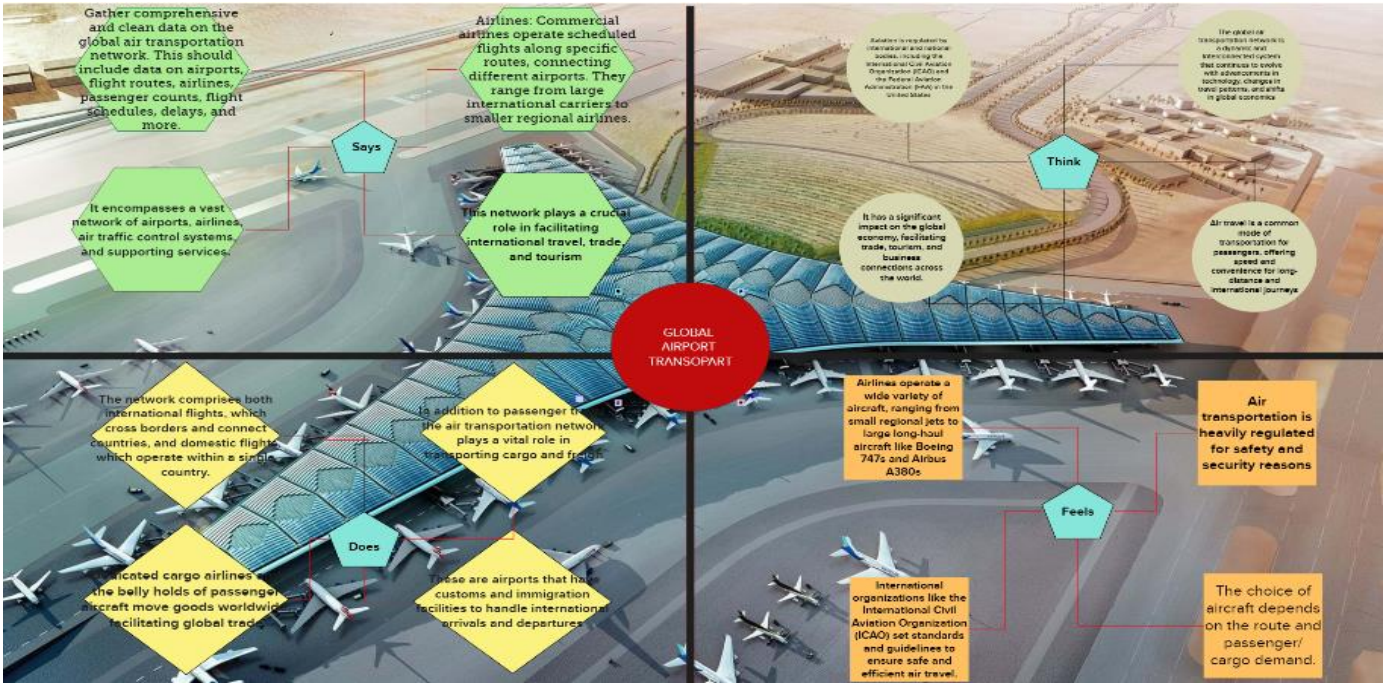
The purpose of the global air transportation network is to connect people and places around the world. It enables businesses and individuals to travel and trade quickly and efficiently. The air transportation network also plays an important role in humanitarian assistance and disaster relief.

PROBLEM DEFINITION & DESIGN THINKING

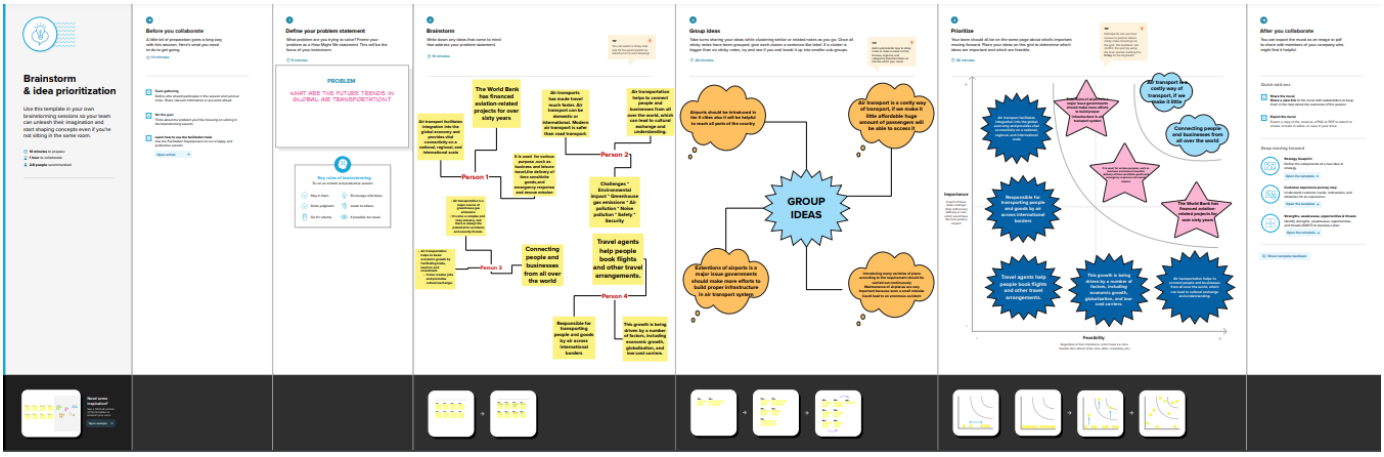
EMPATHY MAP & BRAINSTORMING MAP

In order to fulfil the milestone Empathy map and Brainstorming map was created by group discussions. Those maps are uploaded in github and the links to access those files are hyperlinked here -Brainstorming,Empathy Map

2.1 EMPATHY MAP



2.2 BRAINSTORMING MAP

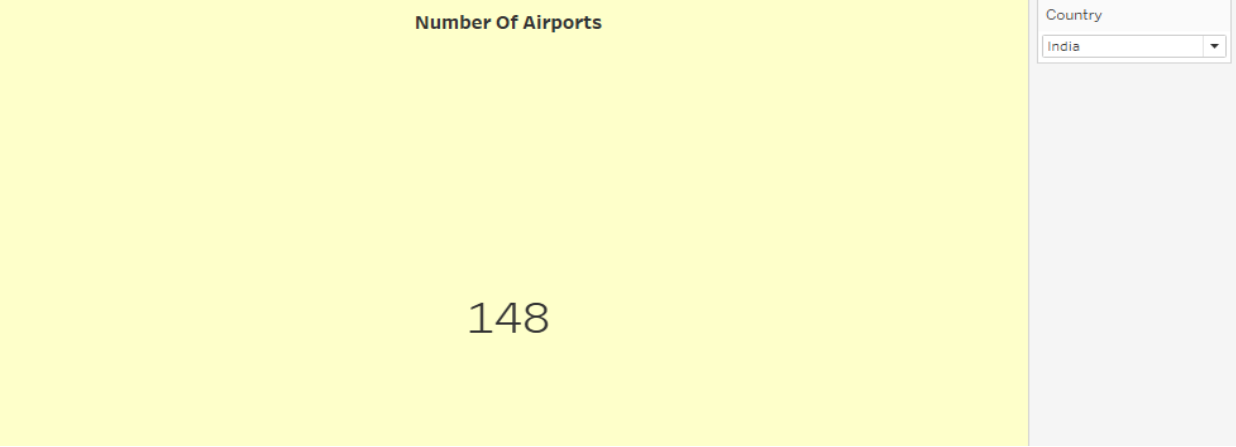


RESULT

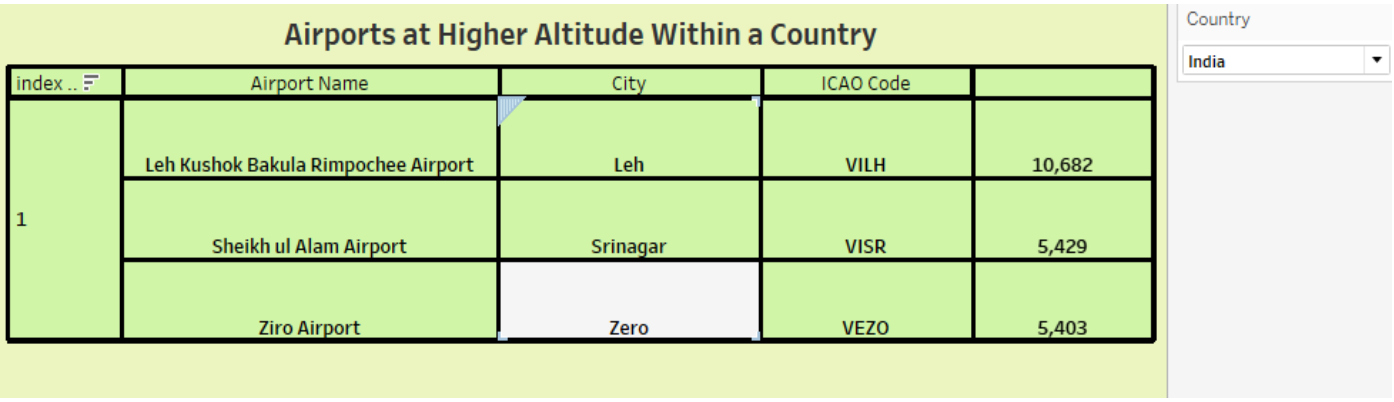
VISULIZATIONS OF SHEETS

1. World map showing details of all Airports within a Country

2.Number of Airports within the country



3. Airports at Higher altitude within a country



Airports at Higher Altitude Within a Country

index ..	Airport Name	City	ICAO Code	
1	Leh Kushok Bakula Rimpochee Airport	Leh	VILH	10,682
	Sheikh ul Alam Airport	Srinagar	VISR	5,429
	Ziro Airport	Zero	VEZO	5,403

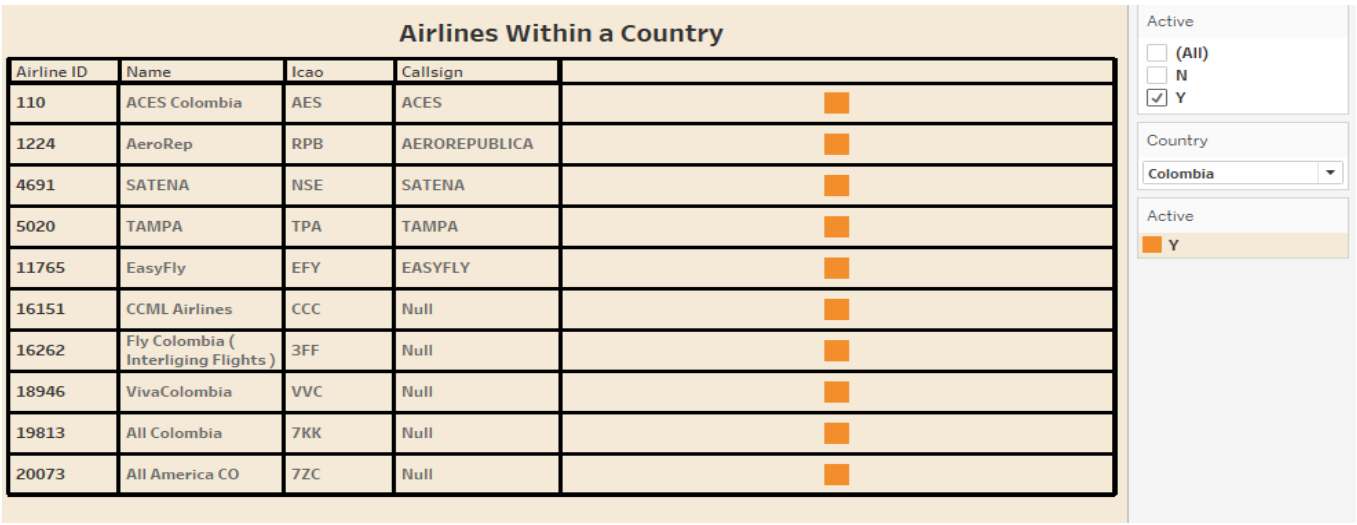
Country: India

4. Airports at Higher altitude in the world

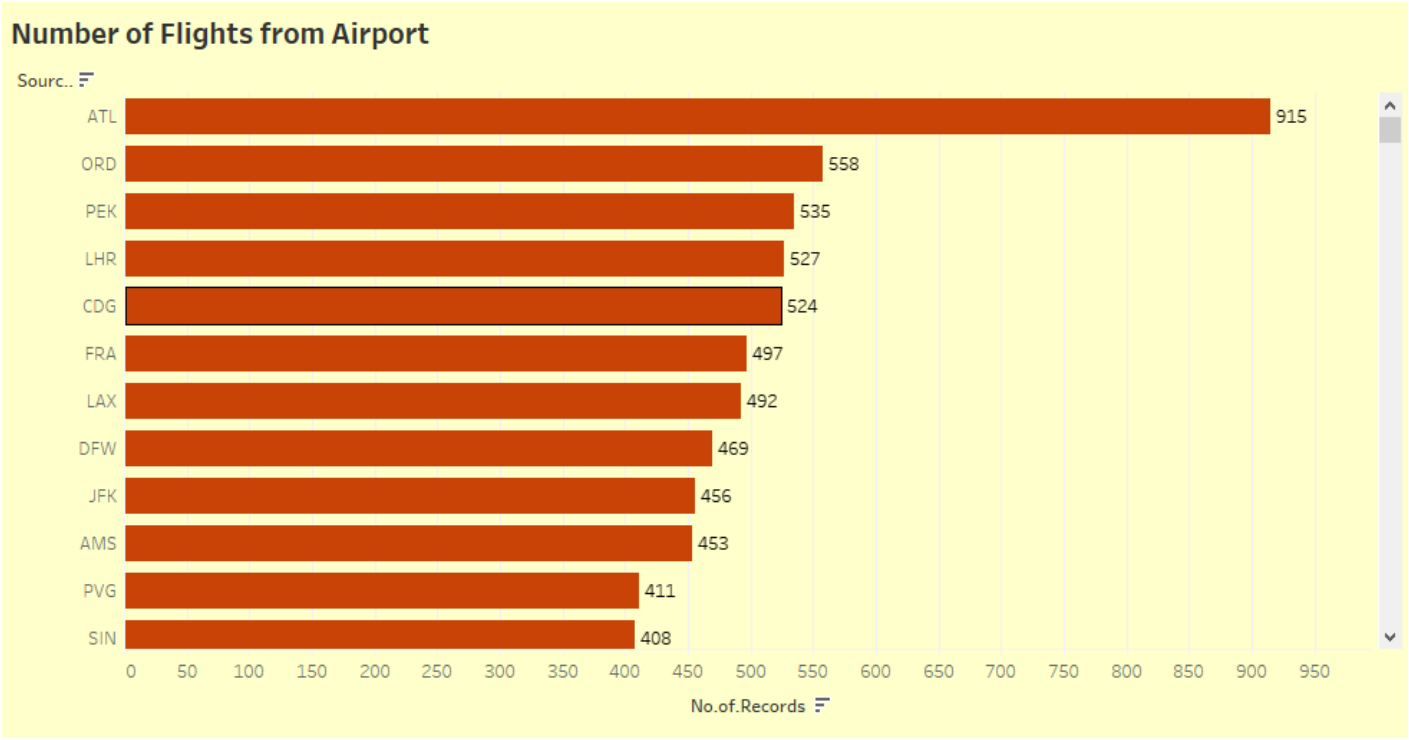
Airports at Highest Altitude In World

Airport Name	City	ICAO Code	
Daocheng Yading Airport	Daocheng	ZUDC	14,472
Qamdo Bangda Airport	Bangda	ZUBD	14,219
Kangding Airport	Kangding	ZUKD	14,042
Ngari Gunsa Airport	Shiquanhe	ZUAL	14,022
El Alto International Airport	La Paz	SLLP	13,355
Capitan Nicolas Rojas Airport	Potosi	SLPO	12,913

5. Airlines within a Country



6. Number of flights from airport



DASHBOARDS

DASHBOARD 1

DASHBOARD 2

Airports at Higher Altitude Within a Country

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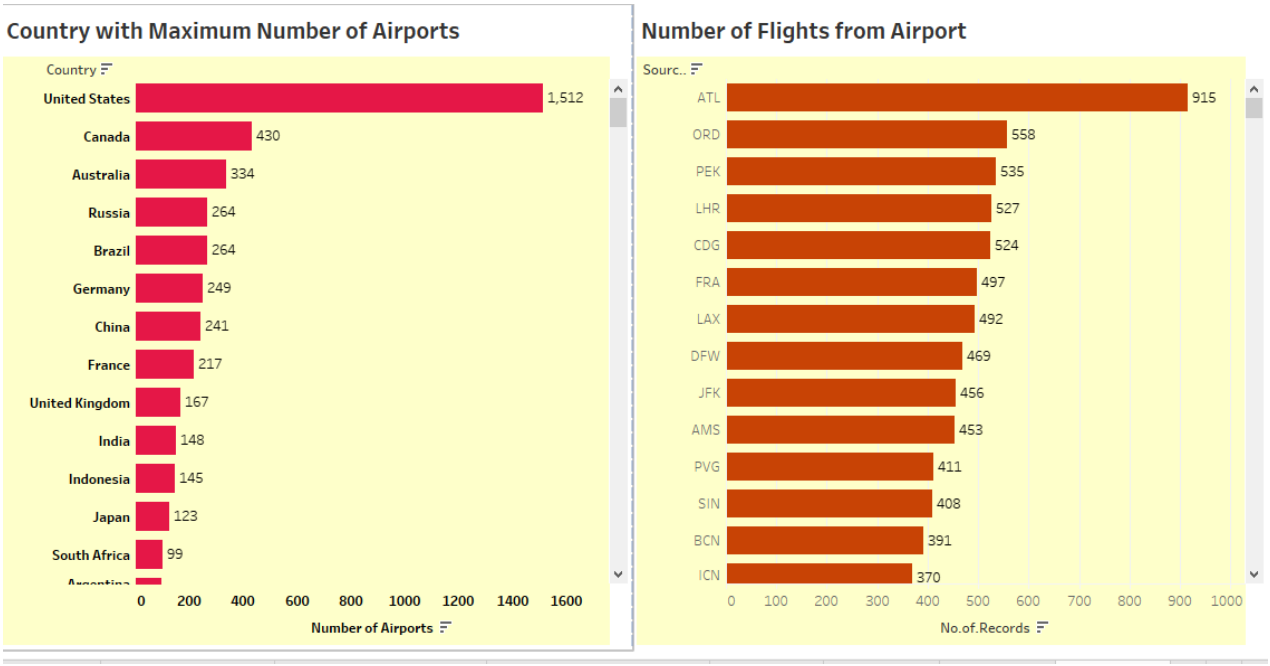
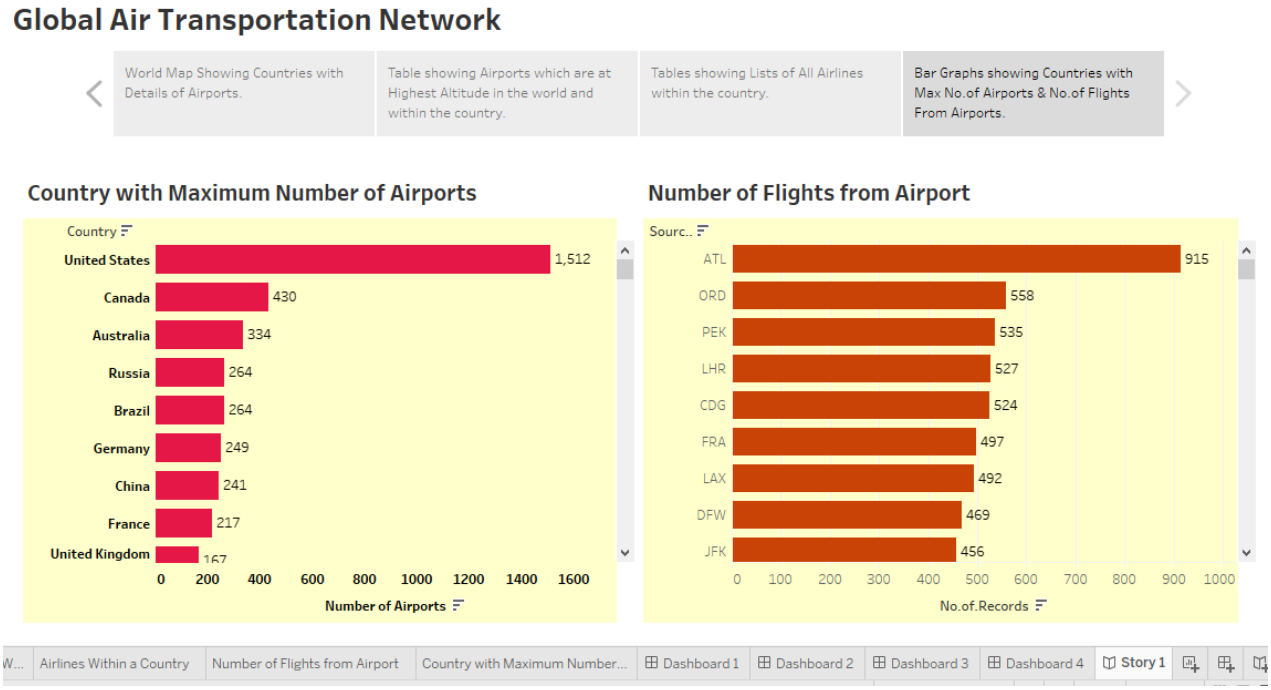
DASHBOARD 3



STORY



In the created story line we have a total of 4 scenes showcasing the details of created worksheets.

The visualisation of sheets, story & dashboard are published in the tableau public server. The link for visiting the site is hyperlinked here - **Tabelau Public Server-Global Air Transportation.**

UTILIZATIONS OF FILTERS

In every worksheet we can apply general or action filters based on input data provided to create visualisations. Based on these action filters the visualisations can be changed in certain aspects of categorisations (i.e., country, city, source etc.).

For an example, the below dashboard represents data without any filters.

Now if we apply an action filter based on number of airports in Australia, we can get data in accordance with the type of filter applied. The below dashboard represents data when filter is applied.

Now we can see that, our dashboard's visualisations have been changed when we apply a filter in the number of airports in Austrailia from all fields to Airports shown only Australia airports.

This is one of the example for Utilisation of filters.

NUMBER OF VISUALIZATIONS/ GRAPHS

1. World map showing details of airport within the country

2. Table showing airports at higher altitude within the country and in the world also.

3. Table showing airlines operating within the country

4. Bar graphs showing no. of flights from airports and no. of airports within the country.

LINKS TO ACCESS PROJECT FILES :

1.Github Repository

2.Brainstorm Map

3.Empathy Map

4.Dashboard

5.Tabelau Public Server-Global Air Transportation

6.Story

7.Visualisation of Sheets

ADVANTAGES

1.Speed and convenience: Air travel is the fastest way to travel long distances. It is also very convenient, as there are airports in most major cities around the world.

2.Capacity: Airplanes can carry a large number of passengers and cargo at once. This makes air transportation very efficient for transporting large volumes of people and goods.

3.Global reach: The global air transportation network connects virtually every country in the world. This makes it possible to travel and trade with people and businesses all over the globe.

4.Economic benefits: Air transportation supports economic growth by facilitating trade and investment. It also creates jobs and generates tax revenue.

6.Cultural exchange: Air travel makes it possible for people from different cultures to meet and interact. This promotes cultural understanding and cooperation.

In addition to these advantages, the global air transportation network also plays an important role in humanitarian assistance and disaster relief. Airplanes can quickly deliver aid to people in need, even in remote areas.

Overall, the global air transportation network is a vital part of the global economy and society. It connects people and places, and it enables us to travel, trade, and communicate quickly and efficiently.

DISADVANTAGES

1.Cost: Air travel can be expensive, especially for long-distance flights.

2.Environmental impact: Air travel produces greenhouse gas emissions, which contribute to climate change.

3.Noise pollution: Airplanes can generate a lot of noise, which can be disruptive to people who live near airports.

4.Security concerns: Air transportation is a target of terrorism and other criminal activity.

5.Delays and cancellations: Flights can be delayed or cancelled for a variety of reasons, such as bad weather, mechanical problems, and air traffic control issues.

In addition to these disadvantages, the global air transportation network is also vulnerable to disruptions caused by natural disasters and other events. For example, the COVID-19 pandemic caused a significant decline in air travel in 2020 and 2021.

APPLICATIONS

The global air transportation network has a wide range of applications, including:

1.Passenger travel: Air travel is the fastest and most convenient way to travel long distances. It is also a popular choice for short-distance travel, especially for business travelers.

2.Cargo transportation: Air transportation is the most efficient way to transport high-value goods, such as electronics, pharmaceuticals, and fresh produce. It is also used to transport humanitarian aid and disaster relief supplies.

3.Business and trade: Air transportation facilitates business and trade by making it possible for people to travel and meet with customers and partners all over the world. It is also used to transport goods to and from markets around the globe.

4.Tourism: Air travel is essential for tourism. It allows people to travel to new places and experience different cultures.

5.Education and research: Air transportation enables students and researchers to travel to different countries to study and collaborate.

6.Humanitarian assistance and disaster relief: Air transportation is essential for delivering humanitarian assistance and disaster relief to people in need. Airplanes can quickly deliver aid to remote areas that are inaccessible by other means of transportation.

7.Medical evacuation: Air transportation can be used to quickly transport patients to hospitals that can provide specialized care.
8.Law enforcement: Air transportation is used by law enforcement agencies to transport suspects, evidence, and personnel.

9.Military: Air transportation is used by the military to transport troops, equipment, and supplies.

The global air transportation network is a vital part of the global economy and society. It connects people and places, and it enables us to travel, trade, and communicate quickly and efficiently.

CONCLUSION

We analyze the global structure of the worldwide air transportation network, a critical infrastructure with an enormous impact on local, national, and international economies. We find that the worldwide air transportation network is a scale-free small-world network. In contrast to the prediction of scale-free network models, however, we find that the most connected cities are not necessarily the most central, resulting in anomalous values of the centrality. We demonstrate that these anomalies arise because of the multicommunity structure of the network. We identify the communities in the air transportation network and show that the community structure cannot be explained solely based on geographical constraints and that geopolitical considerations have to be taken into account. We identify each city's global role based on its pattern of intercommunity and intracommunity connections, which enables us to obtain scale-specific representations of the network.

FUTURE SCOPE

The future scope of the global air transportation network is very promising. The demand for air travel is expected to grow significantly in the coming years, driven by factors such as population growth, rising incomes, and increasing urbanization.

Here are some specific trends that are expected to shape the future of the global air transportation network:

1.Growth in low-cost air travel: Low-cost carriers are expected to play an increasingly important role in the global air transportation network. These carriers offer affordable fares, which is making air travel more accessible to people around the world.

2.Expansion into emerging markets: The air transportation network is expected to expand into emerging markets, such as Asia and Africa. These markets have large and growing populations, and there is a strong demand for air travel in these regions.

3.Development of new technologies: New technologies, such as electric airplanes and autonomous air taxis, are expected to revolutionize the air transportation network. These technologies could make air travel more sustainable and accessible.

4.More electric airplanes: Electric airplanes are expected to become more common in the future. These airplanes are more environmentally friendly than traditional airplanes, and they could also help to reduce noise pollution.

5.Autonomous air taxis: Autonomous air taxis are another technology that is expected to revolutionize the air transportation network. These taxis could provide transportation on demand in urban areas, and they could also be used to connect remote areas.

6.More sustainable aviation fuel: Sustainable aviation fuel is a type of fuel that is made from renewable resources. This fuel is more environmentally friendly than traditional aviation fuel, and it could help to reduce the carbon footprint of the air transportation industry.

In addition to these trends, the global air transportation network is also expected to face a number of challenges, such as climate change and congestion. However, the industry is working to address these challenges through initiatives such as sustainable aviation fuel and air traffic management modernization.

Overall, the future scope of the global air transportation network is very bright. The demand for air travel is expected to grow significantly, and new technologies are expected to revolutionize the industry. However, the industry will need to address challenges such as climate change and congestion in order to meet the growing demand for air travel.