

PROJECT REPORT

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1. INTRODUCTION

1.1 Project Overview

Bike share programs have risen in popularity in recent years and have been promoted as a lower carbon alternative to other forms of transit. Interest in bicycle sharing has been growing exponentially over the past decade, resulting in a proliferation of bike share systems in 712 cities across the world, encompassing 806,000 bicycles and 37,500 stations. This can be largely attributed to the successful incorporation of information technology in docking stations and mobile devices as well as improved logistics such as bicycle rebalancing to ensure responsive supply management. Cities often hope bike sharing will bring many benefits such as extending the reach of transit, substituting motorized trips, and encouraging non-cyclists to try cycling.

The premise of bicycle sharing is that it is a short-term bike rental system, based on varying timed memberships. Members of the bike share network have access to stations, consisting of a pay-station and multiple bike docks, across the system where bikes can be checked out from one station and returned to another nearest to their destination. The appeal of membership is 24/7 access to an automated bike rental network and utility of bikes in completing “last-kilometer connections” without the worry of storage or maintenance. The price system is set to encourage shorter trips (less than 30 minutes in time), with additional fees for any time used over that maximum.

There is evidence that bike share users switch to bike share from motorized transport, such as bus and auto, creating the potential for significant reductions in transportation related greenhouse gas or CO₂e emissions. However, there is significant heterogeneity between different cities, showing that there is not a guaranteed CO₂e reduction benefit from instituting bike share, especially if the trips would not have been made otherwise or are substituting walking and private bicycle trips.

1.2 Purpose

The purpose of this analysis is to create an operating report of Citi Bike for the year 2018. From this analysis, the following data visualizations will be created.

1.Total Number of Trips

2.What is Customer and subscriber with gender

3.Find the top bike used with respect to trip duration?

4.Calculating the number of bikes used by respective age groups.

5.Top 10 Start Station Names with respect to Customer age group

2.LITERATURE SURVEY

2.1 Existing Problem

Spinlister -Spinlister is an online hub for renting bikes from individuals or bike rental shops.

Zagster - Life is better on a bike! They are bringing bike share to communities across the USA.

Motivate International - Motivate is a global full-service bike share operator and technology innovator.

Spin - Spin is a stationless bike and electric scooter sharing service.

2.2 References

<https://craft.co/citi-bike/competitors>

Ines et al.,ScienceDirect-Social and Behavioral Sciences 111 (2014) 518 – 527 “ Bicycle sharing systems demand”

Elias et al.,ScienceDirect Journal of Transport Geography 91 (2021) 102971”What do trip data reveal about bike-sharing system users? “

FRANCESCO et al.,IEEE Access 2020”Bike Sharing and Urban Mobility in a Post-Pandemic”

“A long-term perspective on the COVID-19: The bike sharing system resilience under the epidemic environment”Journal of Transport & Health ,2021

Nguyen ThiHoai Thu, Chu Thi Phuong Dung, Vietnam 2017 International Conference on Advanced Technologies for Communications - Multi-source Data Analysis for Bike Sharing Systems

2.3 Problem statement Definition

In busy cities like New York the people are facing difficulties in analyzing the demand for bikes during peak hours.

The main objective of this project is to predict bike patterns that will be extremely helpful for people to plan their travel.

3.IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP

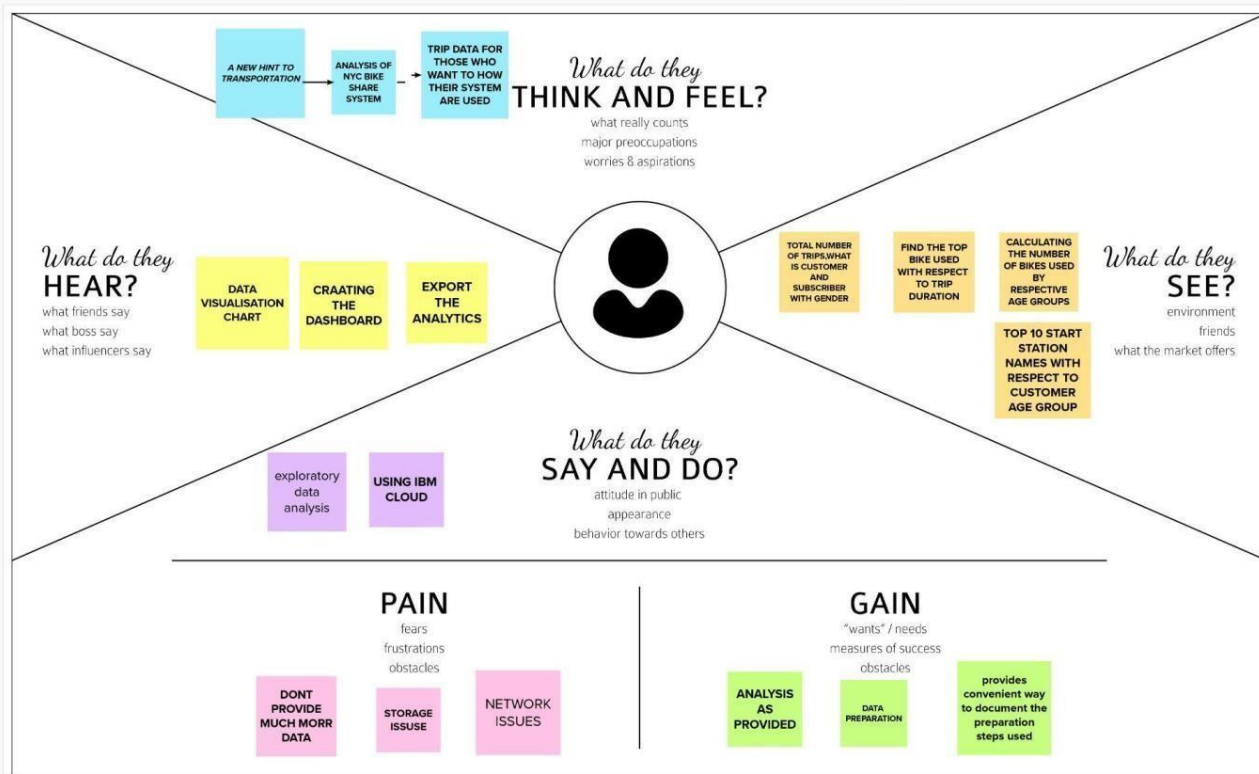
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Empathy Map Canvas

Gain insight and understanding on solving customer problems.

1

Build empathy and keep your focus on the user by putting yourself in their shoes.



Share your feedback

3.2 Proposed Solution

s.no	Parameter	Description
1	Problem Statement (Problem to be solved)	A New Hint to Transportation - An Analysis of the NYC bike share system. This analysis aimsto create an operating report of Citi Bike for the year 2018 and create various data visualizations for given problem queries.
2	Idea / Solution Description	We have with us millions of recorded data. It is difficult to process the data with normal databases. To effectively process and visualize data, we use IBM Cognos, a web-based integrated business intelligence suite by IBM. Using IBM Cognos, we aim to create an operating report, provide useful insights and present them in the form of a dashboard.
3	Novelty / Uniqueness	-> Apart from creating just the data visualizationsthat have been asked, we aim to create an interactive dashboard that can take certain user inputs and display visualizations that are specific to the input. Example: Take as input the start date and end date - Display the total number of trips between the given start and end date -> We plan to find other statistics that can

		<p>be of use to the manufacturers:</p> <ul style="list-style-type: none"> • Coordinates, where any given bike is parked the longest in between the start and end hub - these coordinates, could be those of a potential new hub. • The conversion rate of customers(who could be non-tourists) to subscribers. <p>-> Sending the final resultant statistics as an email to a specific set of people who might benefit greatly from it - they can store it for future use.</p>
4	Social Impact/ Customer Satisfaction	<p>Identifying the age groups and frequently visited locations can help us come up with a more targeted business approach. This is highly helpful when the current system is expanded and new stations are introduced. Availability of an improved, eco-friendly, alternative transport solution that provides health benefits encourages customers to opt for it instead of currently existing transport options.</p>
5	Business Model (Revenue Model	<p>Government can promote environment-friendly bicycles. Fitness companies can run campaigns to target the right customers. Citi Bike has five different sources of revenue, with an annual membership, sponsorship, and casual membership being the three most important. Together these three categories made up over 85% of Citi Bike's total revenue (in 2019).</p>
6	Scalability of the Solution	<p>The creation of the operating report (solution) involves an extended analysis of data presented for the year 2018. Our solution offers high scalability, as not only can it be extended for any number of years provided the right data is offered, but it can also be made use of by other companies as a scalable template that wants to make similar reports on different solutions they offer.</p>

3.3 Problem Solution Fit

Project Title: A New Hint To Transportation-Analysis Of The NYC Bike Share System			Project Design Phase-4 - Solution Fit			Team ID: PNT20227MID09938		
Define CS, fit into CC	<div>1. CUSTOMER SEGMENT(S)</div> <div>Who is your customer? for working parents of 4-6 yrs. kids</div> <div><ul style="list-style-type: none">- Sales team of Citi- Marketing team of Citi- Firms looking to start a new bike sharing system</div>	CC	<div>6. CUSTOMER CONSTRAINTS</div> <div>What constraints prevent your customers from taking action or best-in-class choices of solutions? i.e. spending power, budgets, no fully relevant connections, available resources</div> <div><ul style="list-style-type: none">- Lack of availability of data obtained through detailed data analysis of available information pertaining to the bike sharing system- Limited access to statistical information</div>	CC	<div>5. AVAILABLE SOLUTIONS</div> <div>Which solutions are available to the customers when they face the problem? In regard to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. your work paper is an alternative to digital connectivity</div> <div>Surveys and studies to understand the actual user age groups, frequently visited locations, riding patterns, peak hours etc.</div> <div>Pros:<ul style="list-style-type: none">- Easy and simple to implement- Direct interaction with the end users of the bike share system</div> <div>Cons:<ul style="list-style-type: none">- Limited sample audience - might lead to inadequate understanding- Lack of utilization of all available data</div> <div>Information collected is hard to extract what needed in the future</div>	AS	Explore AS, differentiate	
	<div>2. JOBS-TO-BE-DONE / PROBLEMS</div> <div>Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one, spanning different roles</div> <div>We create an operating report with various forms of visualisations using huge volumes of Citibike user data. The existing data is filtered to extract the essential information. For eg Finding the number of bikes used by different age groups</div>	BL	<div>9. PROBLEM ROOT CAUSE</div> <div>What is the root reason that this problem exists? What is the root story behind the need to do this job? i.e. Customers have to do it because of the change in requirements</div> <div>Data Analytics can help find patterns and useful insights using data which is necessary for the Citibike team to analyze their product delivery system and find areas with scope for improvement</div>	BL	<div>7. BEHAVIOUR</div> <div>What does your customer do to address the problem and get the job done? How many times? Find the right place, parcel, transfer, calculate usage and benefits, indirectly associated customer spend, how time an understanding work (in development)</div> <div>They do not have any insights about gained from user data. Therefore they are unable to promote their product (Citibike) in the best possible way.</div>	BL		Focus on AS, fit into CC, understand CC
Identify along TR & EV	<div>3. TRIGGERS</div> <div>What triggers customers to do something that empowers meaningful positive, making their system efficient, solving their issues</div> <div><ul style="list-style-type: none">- Realizing how unhealthy they are becoming and finding out using bikes can be healthy - this makes the users use the bikes more often which gives the Citi teams more sales- Realizing how much pollution they are causing by making use of vehicles that give out CO2</div>	TR	<div>10. YOUR SOLUTION</div> <div>If you already have an existing business, what does your customer do because of it or the reason, and, check how much it is really working? If you are making a new business proposition, describe in detail what you will deliver, why will it work, why it will be customer-fit, the solution customer, feedback, customer problems and successful customer behaviour</div> <div><ul style="list-style-type: none">- Developing an interactive dashboard that gives various insights about details like finding the number of bikes used by different age groups, etc.- Different visualizations will be displayed on the dashboard for easy analysis. This makes it easier to take business decisions</div>	NE	<div>8. CHANNELS of BEHAVIOUR</div> <div>How do you reach the customer? Do you have a sales team? Do you have a website? Do you have a mobile app? Do you have a social media presence? Do you have a referral program?</div> <div>8.2 ONLINE: The teams at Citi will be able to keep track of the statistics of the usage of Citi bikes online by looking at the dashboards and visualizations.</div>	EV	Identify along TR & EV	
	<div>4. EMOTIONS BEFORE / AFTER</div> <div>How do customers feel about being a customer of your product/service? i.e. how, because of your product, do you feel? i.e. how do you feel about your product/service?</div> <div><ul style="list-style-type: none">- Users of the bikes will feel extremely satisfied after a good ride which in turn will give the teams at Citi satisfaction- Customers will feel good about giving back to the community by reducing carbon footprint</div>	EV	<div>OFFLINE:</div> <div>The teams at Citi will be involved in offline work like installing new bike hubs and trying to work off site to find the problems faced by users of the Citi bike. They also try to keep new bikes in stock in all hubs.</div>					

4. REQUIREMENT ANALYSIS

4.1 Functional Requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Collection of Data	Usage of the NYC Citi Bike helps generate data regarding the different trips taken by different people using Citi Bike. These data were then categorized and provided as datasets, on which further analysis and visualization are to be carried out
FR-4	Analysis of Data	Analysis of the given data includes carrying out preprocessing & filtering the data as per the requirement posed by the sub-task. The usage of Machine Learning techniques to gain further insights into the data also contributes to the analysis, and as a result visualization of data.
FR-5	Display (Visualization) of Data	Different visualizations are carried out depending on the sub-task dealt with. These visualizations are then pooled and displayed on a dashboard - which serves as a tool to provide business insights to customers. Some of the different sub-tasks involved in this requirement include finding the top 10 Start station names with respect to customer age group, displaying the top bikes used with respect to trip duration etc.

4.2 NON-Functional Requirement

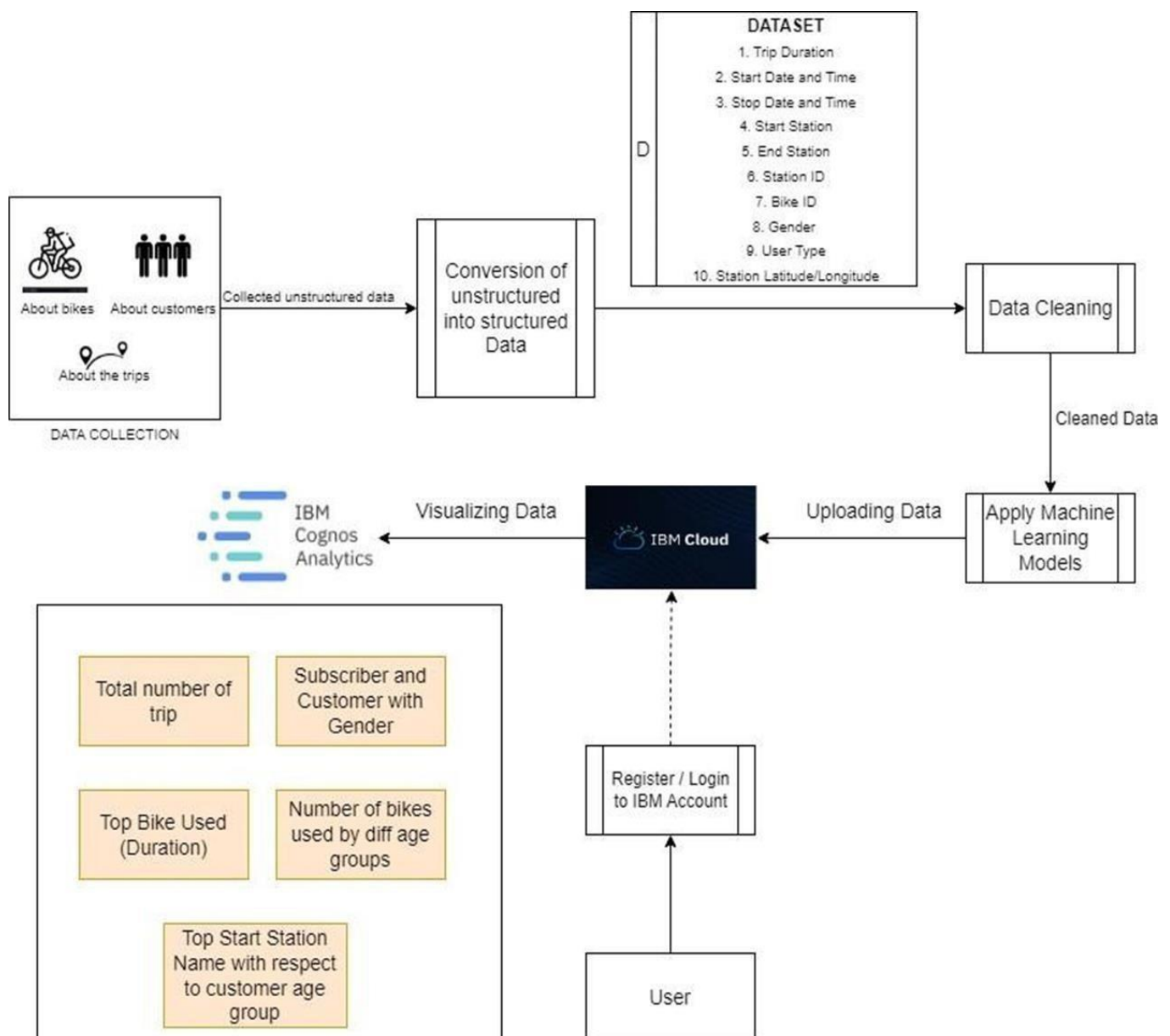
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The dashboard gives users access to an operational report that is simple to read and useful for understanding market trends and company insights. Data can be examined from various angles and in more depth by using an interactive dashboard to drill down and filter operating information.

NFR-2	Security	Based on the Citi Bike utilisation data and its analysis, several important business decisions will be made, which will be appropriately secured. Data and visualisation reports are only available to a certain group of clients/users.
NFR-3	Reliability	This research offers a trustworthy and effective way to understand how well this bike-sharing programme performed in 2018. Utilizing the IBM Cognos Platform ensures operational report production, upkeep, and accessibility with industry-standard reliability (dashboard).
NFR-4	Performance	The effectiveness of a bike-sharing system in terms of both its spatial and operational efficiency. In order to increase the operational effectiveness of the bike-sharing system, it is critical to assess the state of bike lanes from the viewpoint of public bike riders. The characteristics of bike stations and the distance between bike stations and other amenities are examined by the bike-sharing system dashboard. The evaluation findings can be used to enhance the public bike-sharing service.
NFR-5	Availability	The bicycle-sharing programme is a form of shared transportation in which people can rent bicycles at a reasonable cost for a limited amount of time. CitiBike offers two different kinds of docking systems: docking systems, which allow customers to borrow a bike from one dock and return it to another port within the system; and dockless systems, which are node-free and depend on smart technology. Both forms can use smartphone online mapping to find close-by ports and bikes that are available.
NFR-6	Scalability	<p>Urban inhabitants can immediately get access to bike-sharing programmes, which may make the transportation system more dependable. The programme can be expanded to include locations that are now unreachable by this type of transportation, as well as cities other than New York City, if the necessary data is available and obtained.</p> <p>This research will eventually be able to give a more in-depth picture of how bike-sharing functions in emergency situations as additional data becomes available, particularly in other cities with comparable extensive bike-sharing systems.</p>

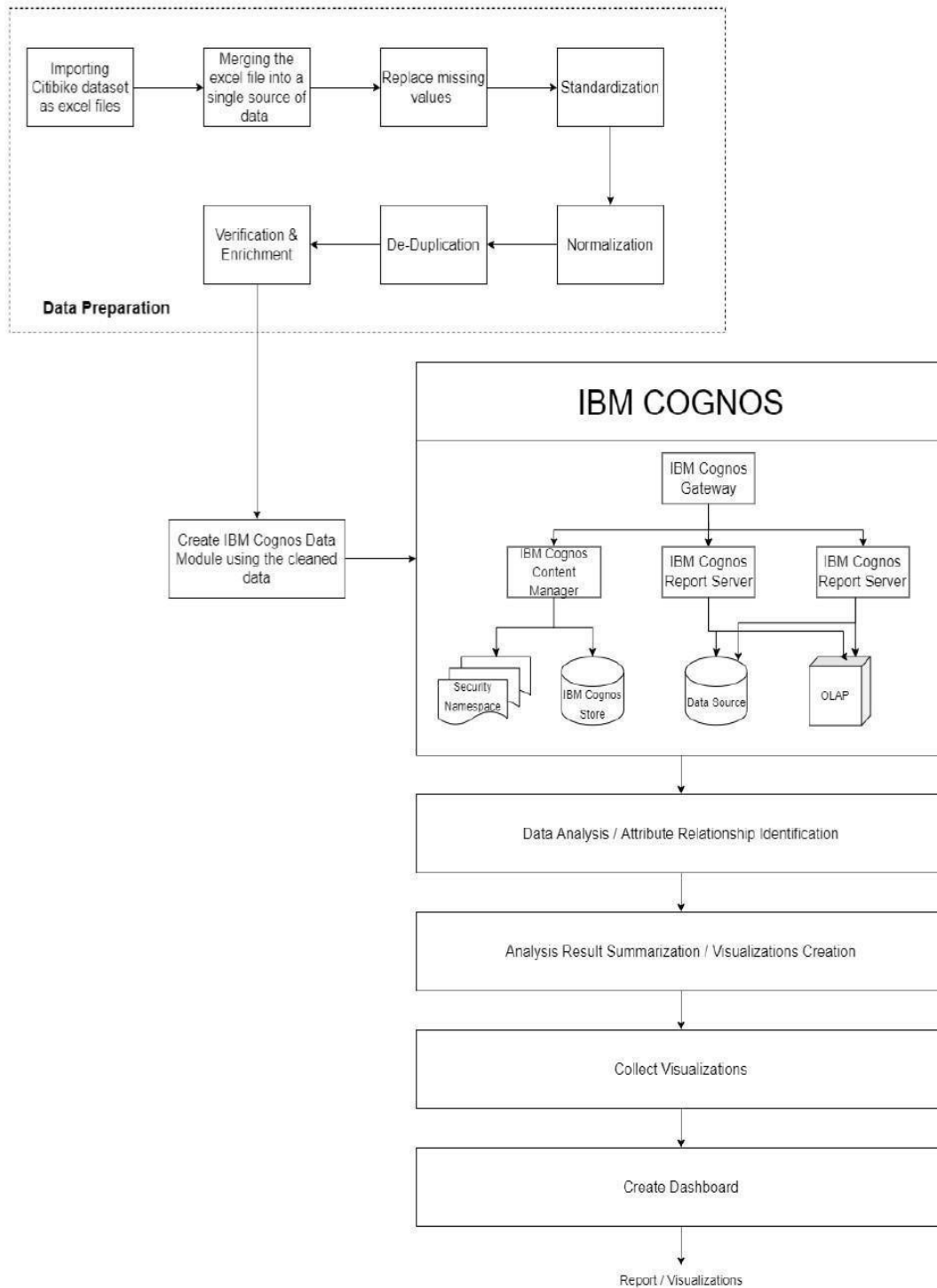
5.PROJECT DESIGN

5.1 Data Flow Diagram

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.



5.2 Solution Architecture Diagram:



5.3 User Stories:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer(Analysts at Citi, Government)	Registration	USN-1	As a user, I should be able to register to see the dashboard as a new user	Successful Registration	High	Sprint-1
Customer(Analysts at Citi, Government)	Login	USN-2	As a user I should be able to login to see the dashboard with the correct credentials	Successful Login with correct credentials	High	Sprint-1
Customer(Analysts at Citi, Government)	Accessing the dashboard	USN-3	As a user, I should be able to view the visualizations displayed	Should be able to view the following analysis among others : 1. Total number of trips 2. Subscriber and Customer with gender 3. Top Bike used with respect to duration 4. Number of bikes used by different age groups 5. Top start station name with respect to customer age group	High	Sprint-1
Customer(Analysts at Citi, Government)	Manipulating the data	USN-4	As a user I should be able to apply some modifications to the data to see how the resultant visualizations change	I should have the permission to manipulate the data	High	Sprint-2

6.PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Balapriya M, Abinaya A
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	2	High	Arunbalaji S, Arunprakash H
Sprint-1		USN-3	As a user, I can register for the application through Gmail	2	Medium	Balapriya M, Arunprakash H.
Sprint-2	Login	USN-4	As a user, I can log into the application by entering email & password	2	High	Balapriya M, Abinaya A, Arunbalaji S.

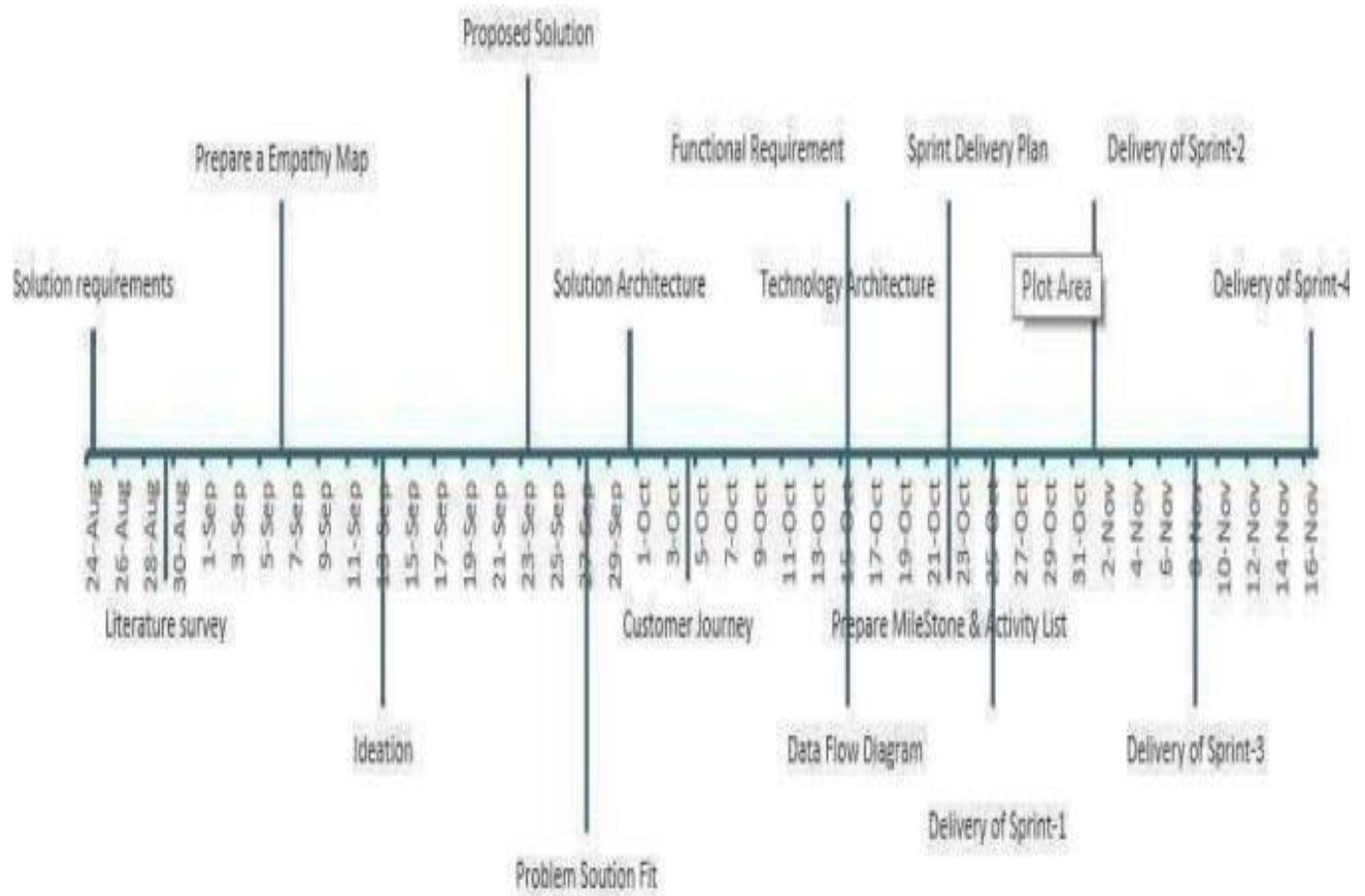
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2	Collection of user data	USN-5	I can access and collect the citi bike share system data from Lyft citi bike's official website that has the published files.	2	Medium	Balapriya M, Arunprakash H.
Sprint-2		USN-6	I can use the citi bike share system data for analysis purposes	5	High	Balapriya M, Abinaya A.
Sprint-3	Analysing the user data	USN-7	The data is used as input for creating various types of visualizations and analysis is done. I can view the analysis of the citi bike	8	High	Balapriya M, Abinaya A, Arunbalaji S.

Sprint-3	Dashboard	USN-8	I can register & access the dashboard created based on the analysis by logging in	3	Medium	Abinaya A, Arunprakash H, Arunbalaji S.
Sprint-3		USN-9	As a user I can view the dashboard that displays the top bike used with respect to trip duration	5	High	Balapriya M.
Sprint-4		USN-10	As a user I can view the dashboard that displays the top 10 Start Station Names with respect to customer age group	5	High	Abinaya A.
Sprint-4		USN-11	As a user I can view the dashboard that displays the customer and subscriber with respect to gender	5	High	Arunbalaji S.
Sprint-4		USN-12	As a user I can view the dashboard that displays the total number of trips	5	High	Arunprakash H.

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)
Sprint-1	6	6 Days	24 Oct 2022	29 Oct 2022
Sprint-2	9	6 Days	31 Oct 2022	05 Nov 2022
Sprint-3	16	6 Days	07 Nov 2022	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022

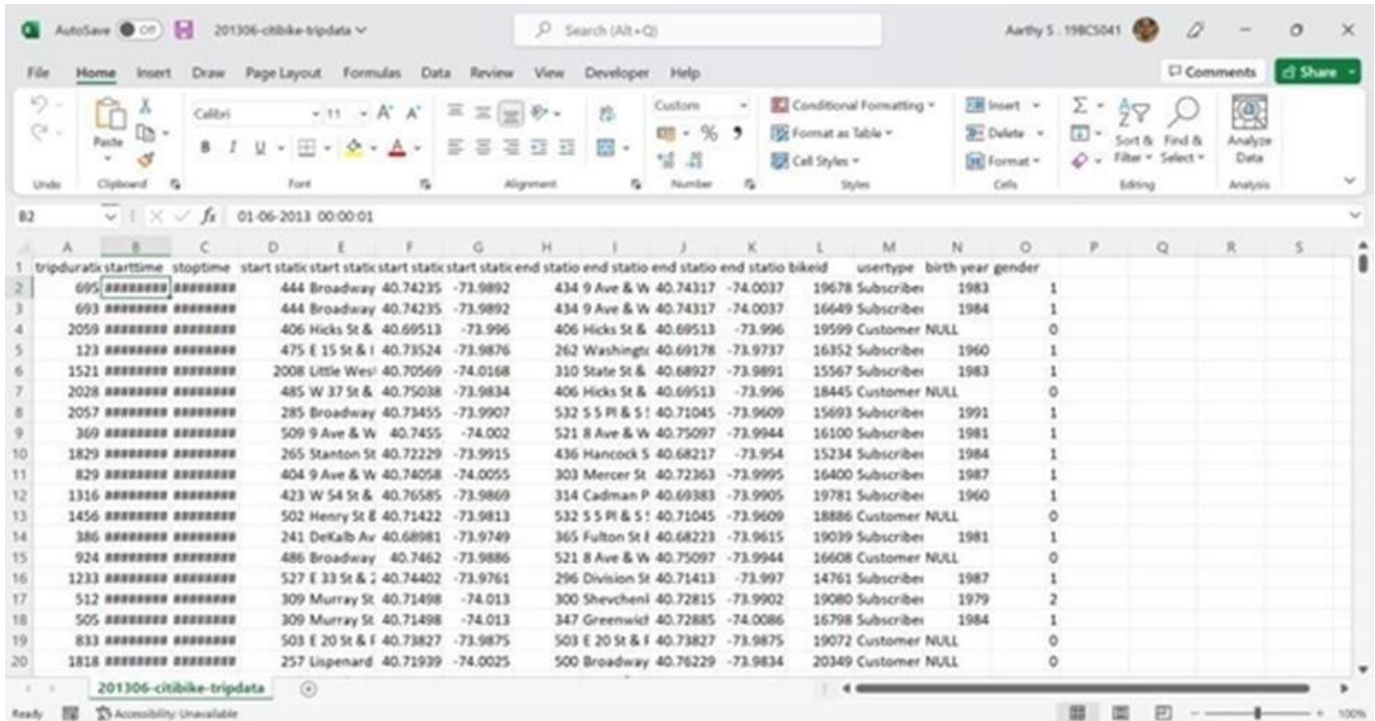
6.2 Sprint Delivery Schedule

Milestone Timeline Chart



7.WORKING WITH THE DATASET & DATA VISUALISATION

7.1 Understanding the dataset



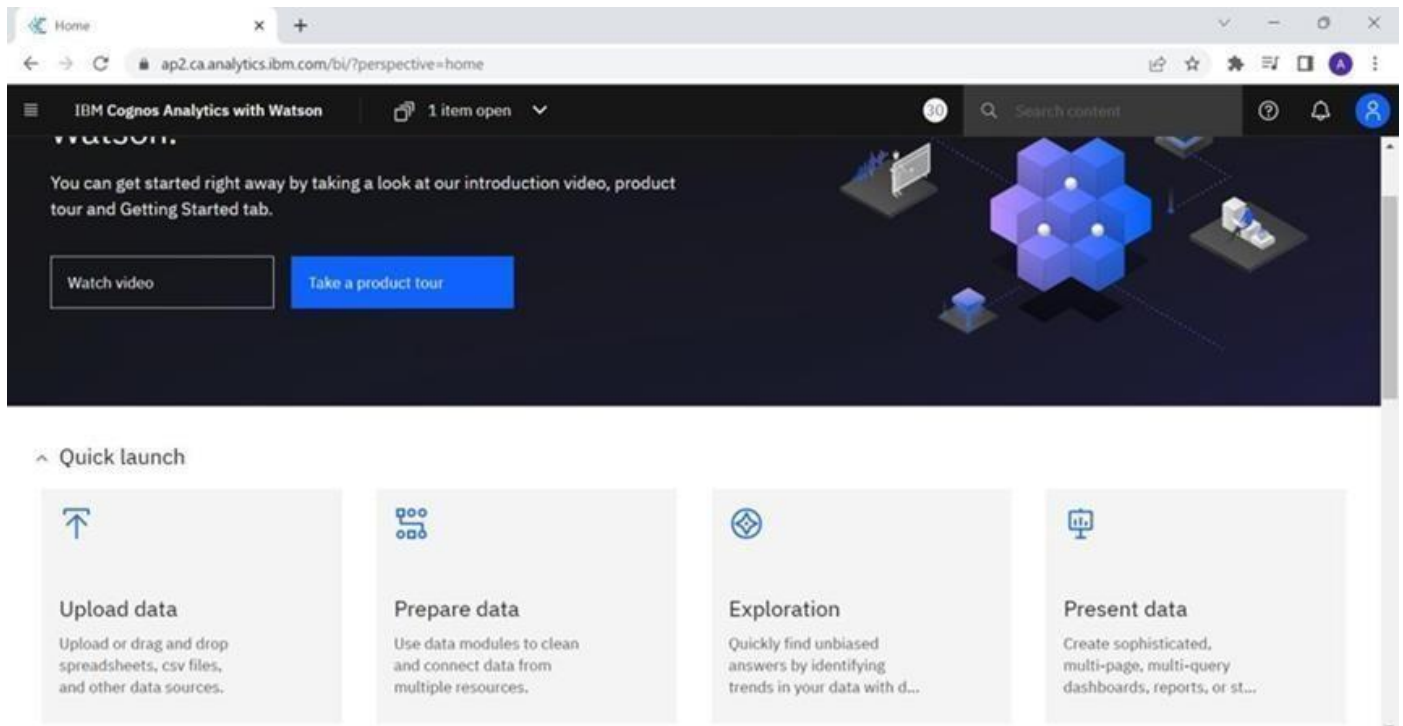
tripduration	starttime	stoptime	start station	start station id	start station name	end station	end station id	end station name	bikeid	usertype	birth year	gender
695	01-06-2013 00:00:01	01-06-2013 00:00:01	444 Broadway	40.74235	-73.9892	434 9 Ave & W	40.74317	-74.0037	19678	Subscriber	1983	1
693	01-06-2013 00:00:01	01-06-2013 00:00:01	444 Broadway	40.74235	-73.9892	434 9 Ave & W	40.74317	-74.0037	16649	Subscriber	1984	1
2059	01-06-2013 00:00:01	01-06-2013 00:00:01	406 Hicks St &	40.69513	-73.996	406 Hicks St &	40.69513	-73.996	19599	Customer	NULL	0
123	01-06-2013 00:00:01	01-06-2013 00:00:01	475 E 15 St & I	40.73524	-73.9876	262 Washingtc	40.69178	-73.9737	16352	Subscriber	1960	1
1521	01-06-2013 00:00:01	01-06-2013 00:00:01	2008 Little West	40.70569	-74.0168	310 State St &	40.68927	-73.9891	15567	Subscriber	1983	1
2028	01-06-2013 00:00:01	01-06-2013 00:00:01	485 W 37 St &	40.75038	-73.9834	406 Hicks St &	40.69513	-73.996	18445	Customer	NULL	0
2057	01-06-2013 00:00:01	01-06-2013 00:00:01	285 Broadway	40.73455	-73.9907	532 S 5 Pl & S	40.71045	-73.9609	15693	Subscriber	1991	1
369	01-06-2013 00:00:01	01-06-2013 00:00:01	509 9 Ave & W	40.7455	-74.002	521 8 Ave & W	40.75097	-73.9944	16100	Subscriber	1981	1
1829	01-06-2013 00:00:01	01-06-2013 00:00:01	265 Stanton St	40.72229	-73.9915	436 Hancock S	40.68217	-73.954	15234	Subscriber	1984	1
829	01-06-2013 00:00:01	01-06-2013 00:00:01	404 9 Ave & W	40.74058	-74.0055	303 Mercer St	40.72363	-73.9995	16400	Subscriber	1987	1
1316	01-06-2013 00:00:01	01-06-2013 00:00:01	423 W 54 St &	40.76585	-73.9869	314 Cadman Pl	40.69383	-73.9905	19781	Subscriber	1960	1
1456	01-06-2013 00:00:01	01-06-2013 00:00:01	502 Henry St &	40.71422	-73.9813	532 S 5 Pl & S	40.71045	-73.9609	18886	Customer	NULL	0
386	01-06-2013 00:00:01	01-06-2013 00:00:01	241 DeKalb Av	40.68981	-73.9749	365 Fulton St	40.68223	-73.9615	19039	Subscriber	1981	1
924	01-06-2013 00:00:01	01-06-2013 00:00:01	486 Broadway	40.7462	-73.9886	521 8 Ave & W	40.75097	-73.9944	16608	Customer	NULL	0
1233	01-06-2013 00:00:01	01-06-2013 00:00:01	527 E 33 St &	40.74402	-73.9761	296 Division St	40.71413	-73.997	14761	Subscriber	1987	1
512	01-06-2013 00:00:01	01-06-2013 00:00:01	309 Murray St	40.71498	-74.013	300 Shevcheni	40.72815	-73.9902	19080	Subscriber	1979	2
505	01-06-2013 00:00:01	01-06-2013 00:00:01	309 Murray St	40.71498	-74.013	347 Greenwich	40.72885	-74.0086	16798	Subscriber	1984	1
833	01-06-2013 00:00:01	01-06-2013 00:00:01	503 E 20 St & F	40.73827	-73.9875	503 E 20 St & F	40.73827	-73.9875	19072	Customer	NULL	0
1818	01-06-2013 00:00:01	01-06-2013 00:00:01	257 Lispenard	40.71939	-74.0025	500 Broadway	40.76229	-73.9834	20349	Customer	NULL	0

Dataset Link: [Dataset](#)

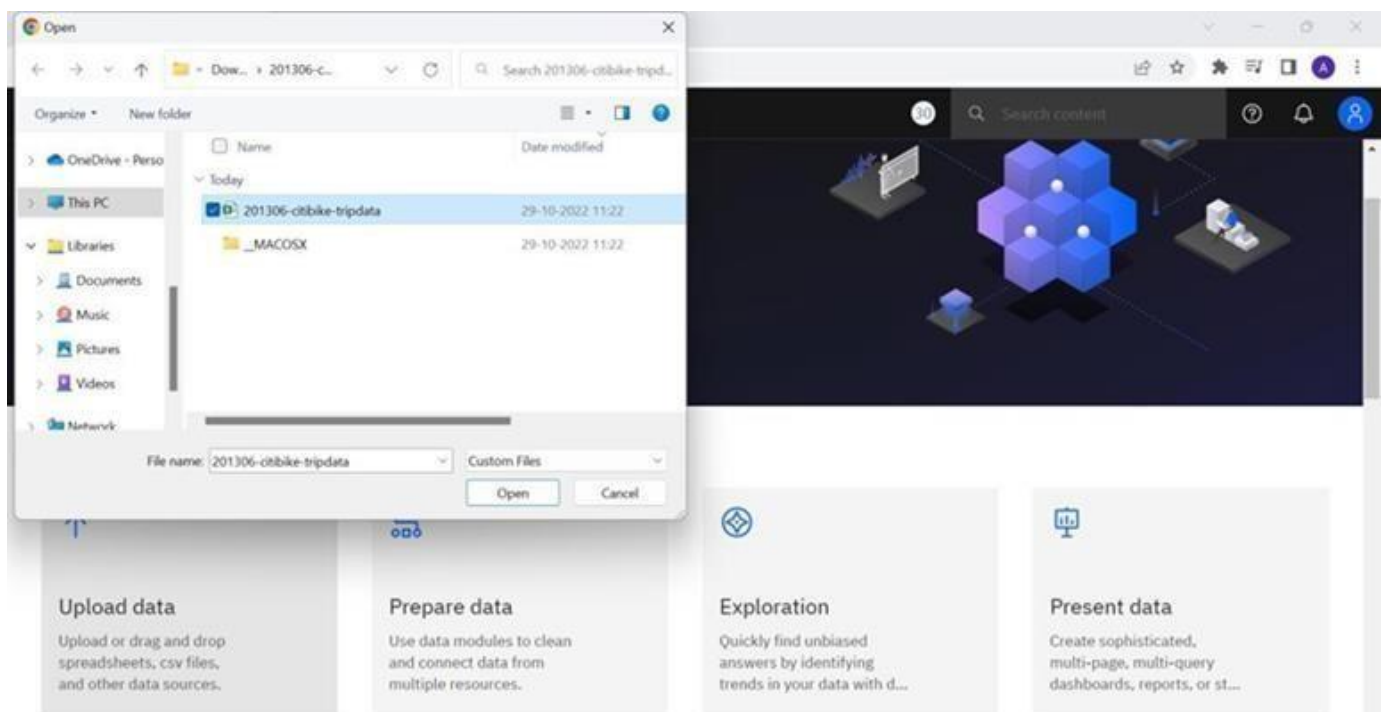
- 1.Trip Duration: How long a trip lasted in seconds**
- 2.Start Date and Time: EX->01-06-2013 00:00:01**
- 3.Stop Date and Time: EX->01-06-2013 00:11:36**
- 4.Start Station ID: Unique identifier for each station**
- 5.Start Station Name**
- 6.Start Station Latitude: Coordinates**
- 7. Start Station Longitude: Coordinates**
- 8.End Station ID: Unique identifier for each station**
- 9.End Station Name**
- 10.End Station Latitude**
- 11.End Station Longitude**
- 12. Bike ID: Unique identifier for each bike**
- 13. User Type (Customer = 24-hour pass or 3-day pass user; Subscriber = Annual Member): Customers are usually tourists, subscribers are usually NYC residents**
- 14. Year of Birth: Self-entered, not validated by an ID Gender (Zero=unknown; 1=male; 2=female): Usually unknown for customers since they often sign up at a kiosk**

7.2 Loading the dataset

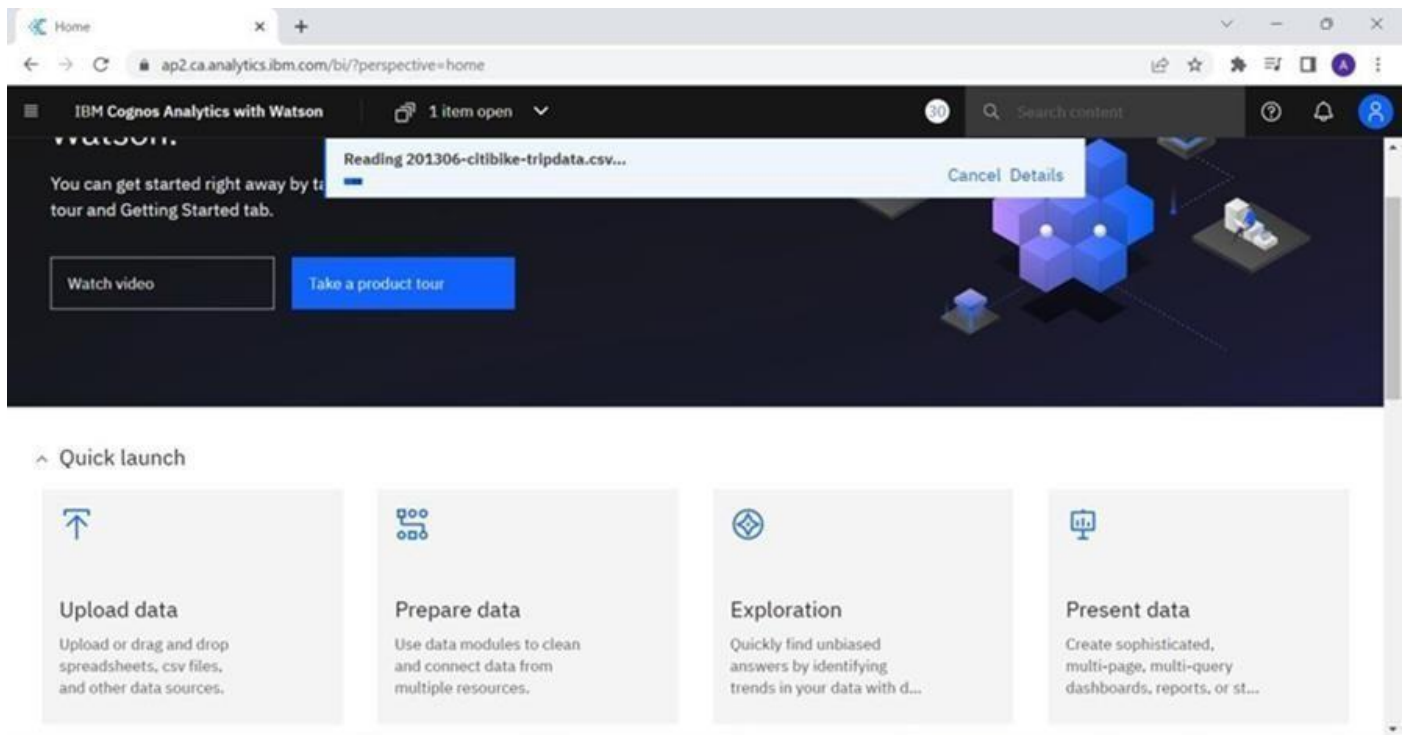
Open Cognos Analytics and click upload data



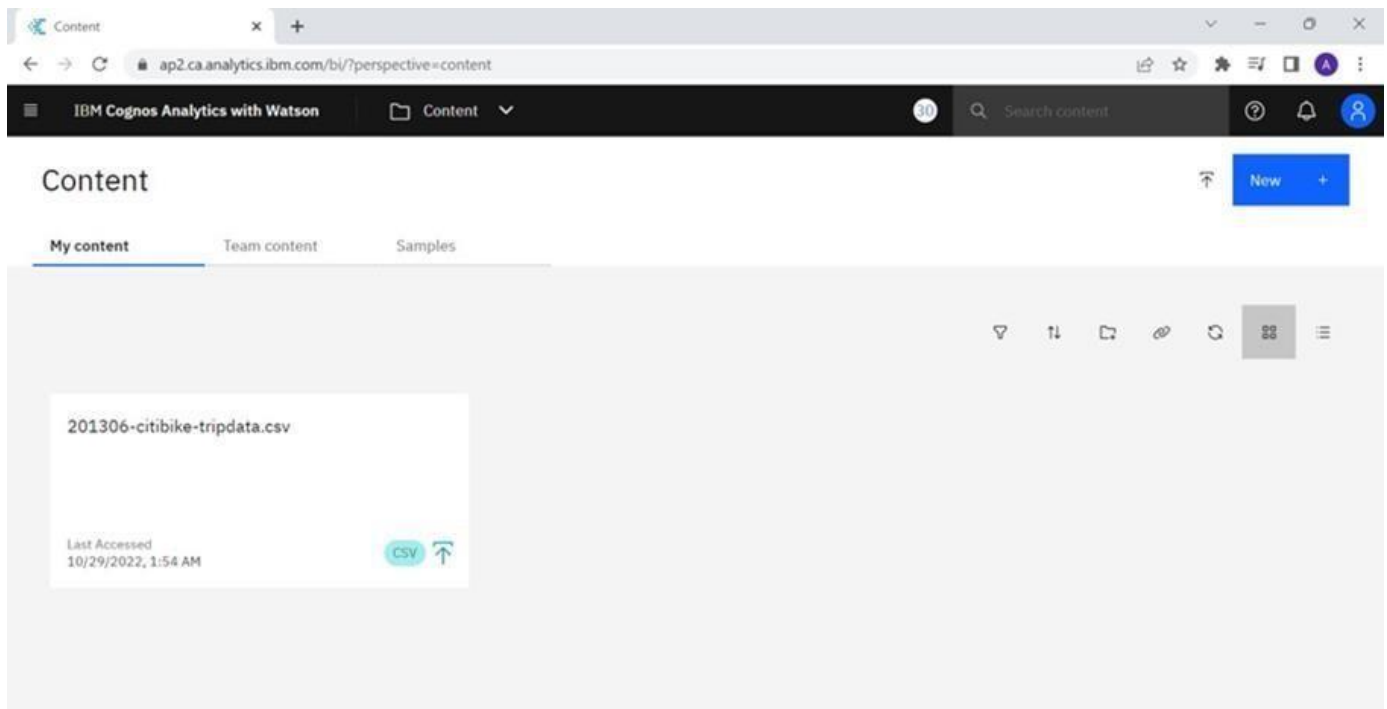
Select the dataset to be uploaded



The excel file is getting uploaded in Cognos Analytics

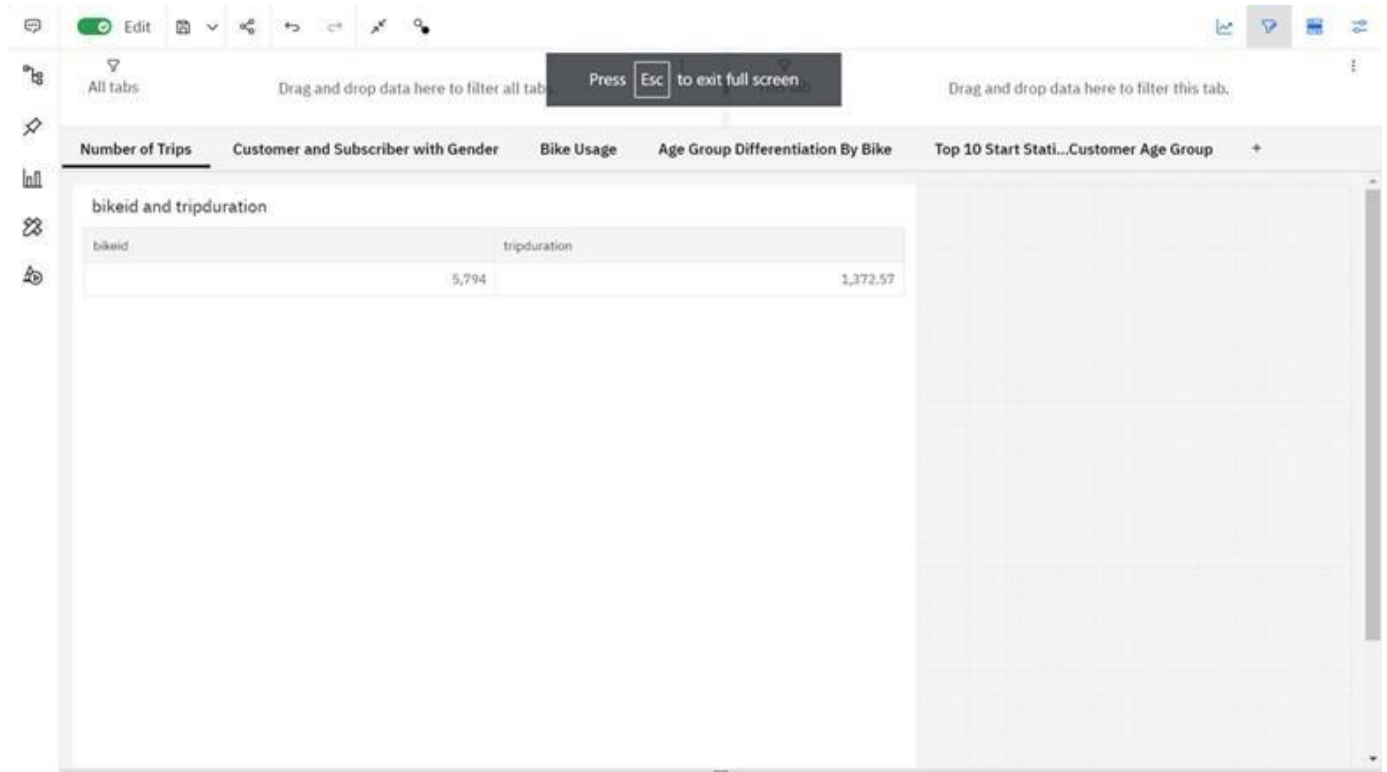


The dataset can be accessed in My Content in Cognos Analytics



7.3 Visualization charts

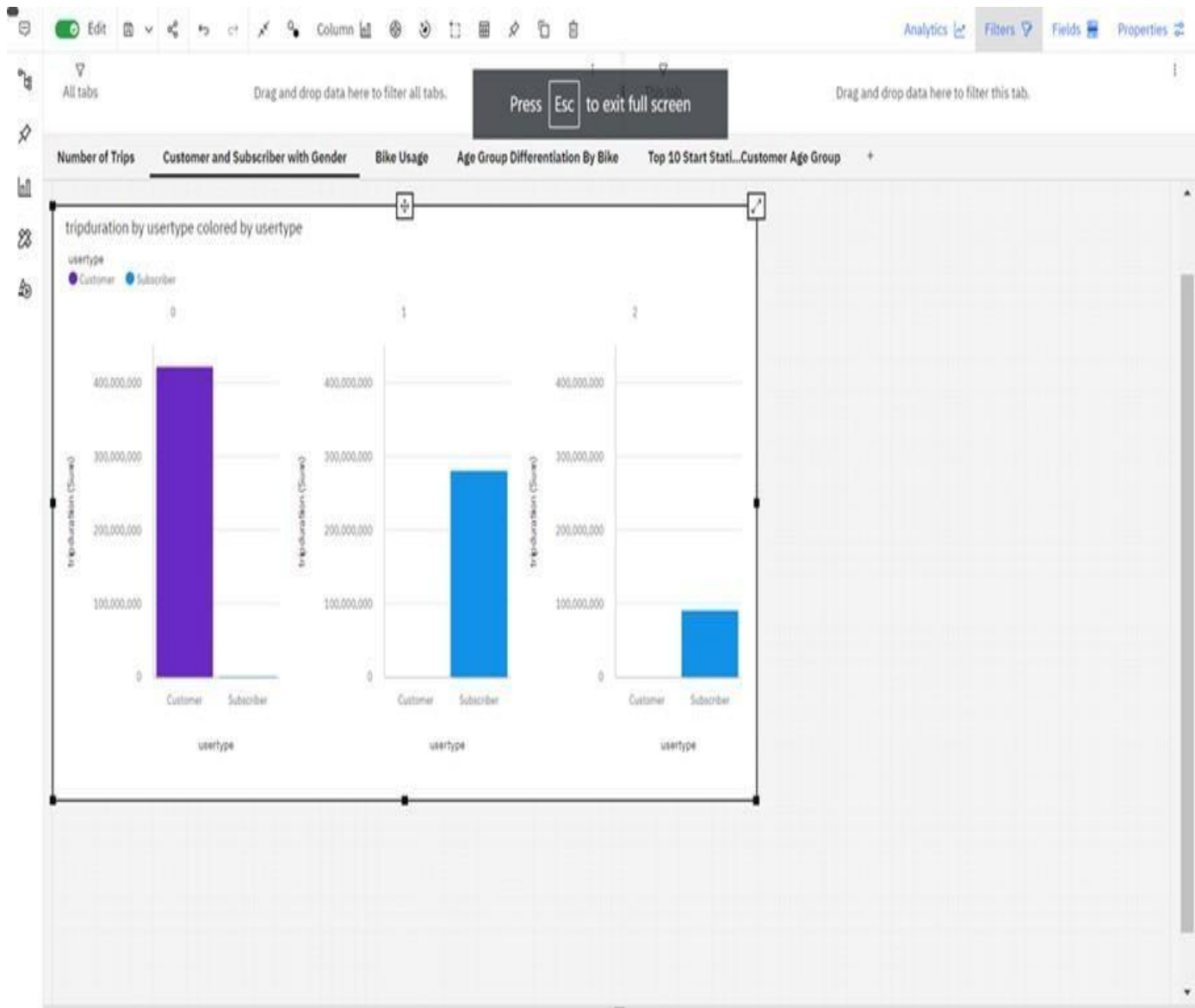
Number of Trips:



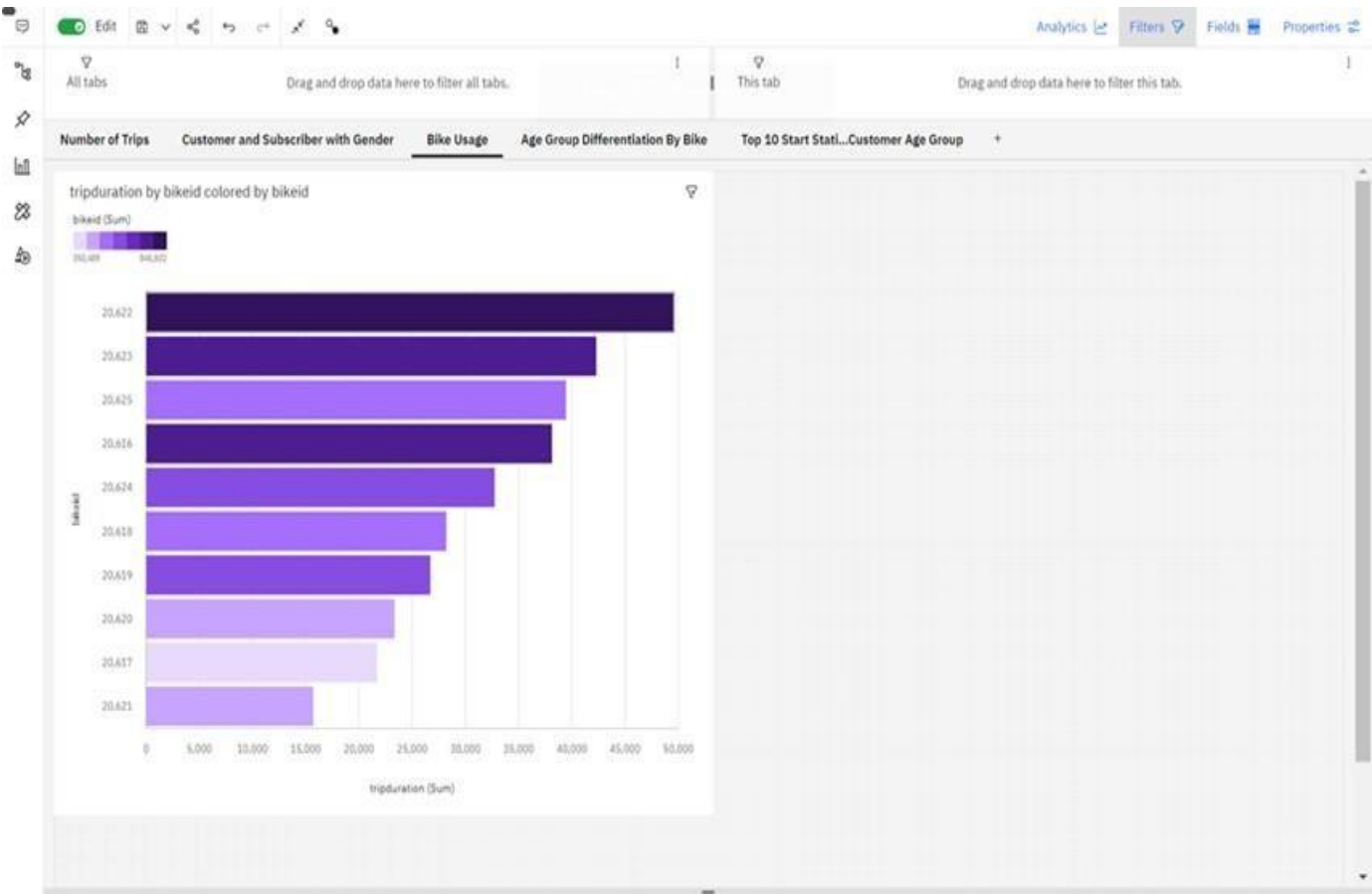
The screenshot shows a Tableau workspace in full-screen mode. At the top, there is a toolbar with icons for chat, edit, save, share, undo, redo, and zoom. Below the toolbar, a dark grey banner displays the text "Press Esc to exit full screen". The interface features a tabbed navigation bar with five tabs: "Number of Trips" (selected), "Customer and Subscriber with Gender", "Bike Usage", "Age Group Differentiation By Bike", and "Top 10 Start Stati...Customer Age Group". On the left side, there is a vertical sidebar with icons for a key, a pin, a bar chart, a scatter plot, and a person. The main content area displays a table titled "bikeid and tripduration". The table has two columns: "bikeid" and "tripduration". The first row of data shows the values "5,794" and "1,372.57".

bikeid	tripduration
5,794	1,372.57

Customer and Subscriber with Gender:



Bike Usage:



Age group differentiation by bike

Analytics

Filters

Fields

Properties

All tabs

Drag and drop data here to filter all tabs.

Press Esc to exit full screen

Drag and drop data here to filter this tab.

Number of Trips

Customer and Subscriber with Gender

Bike Usage

Age Group Differentiation By Bike

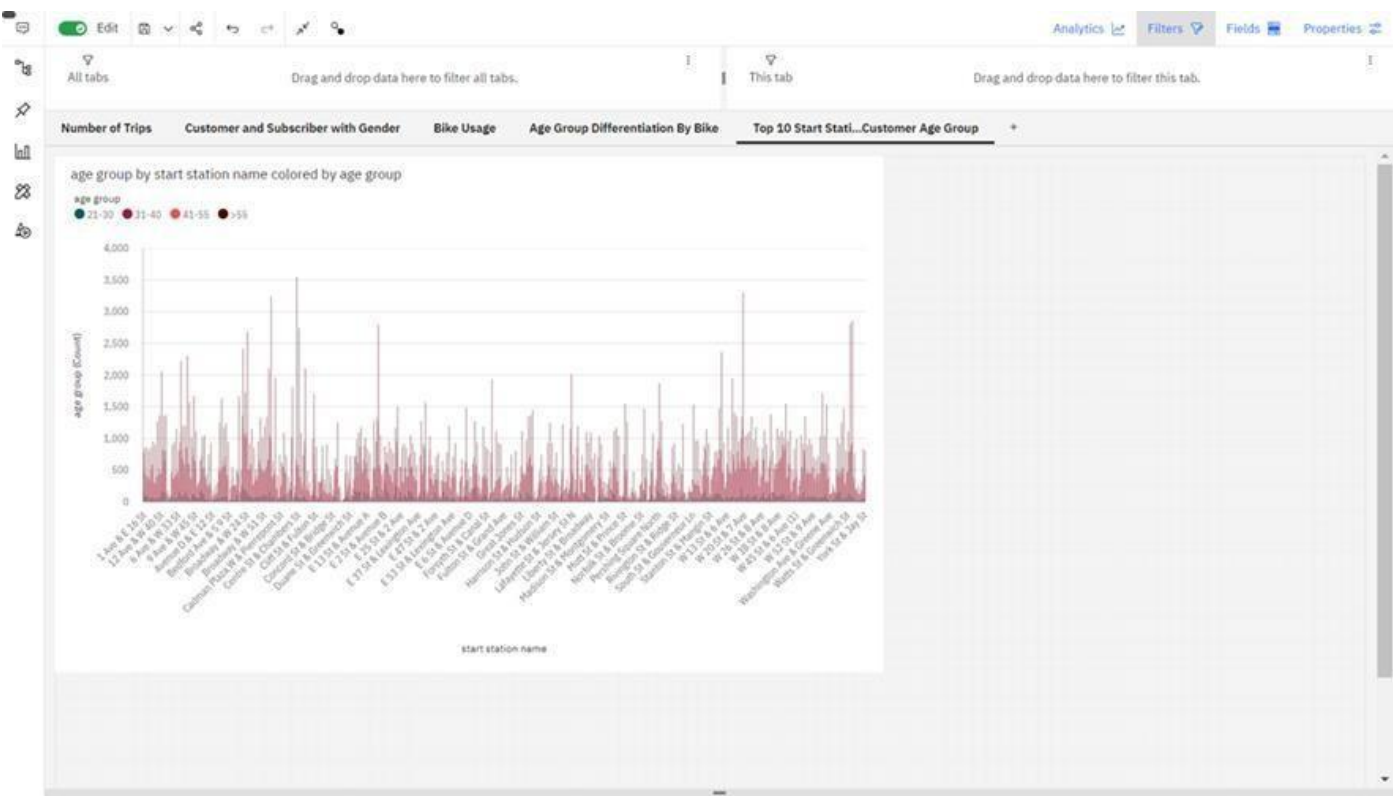
Top 10 Start Stati...Customer Age Group

+

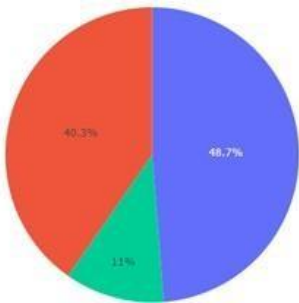
age group and bikeid

age group	bikeid	
21-30		5,389
31-40		5,754
41-55		5,755
>55		5,784
Summary		5,794

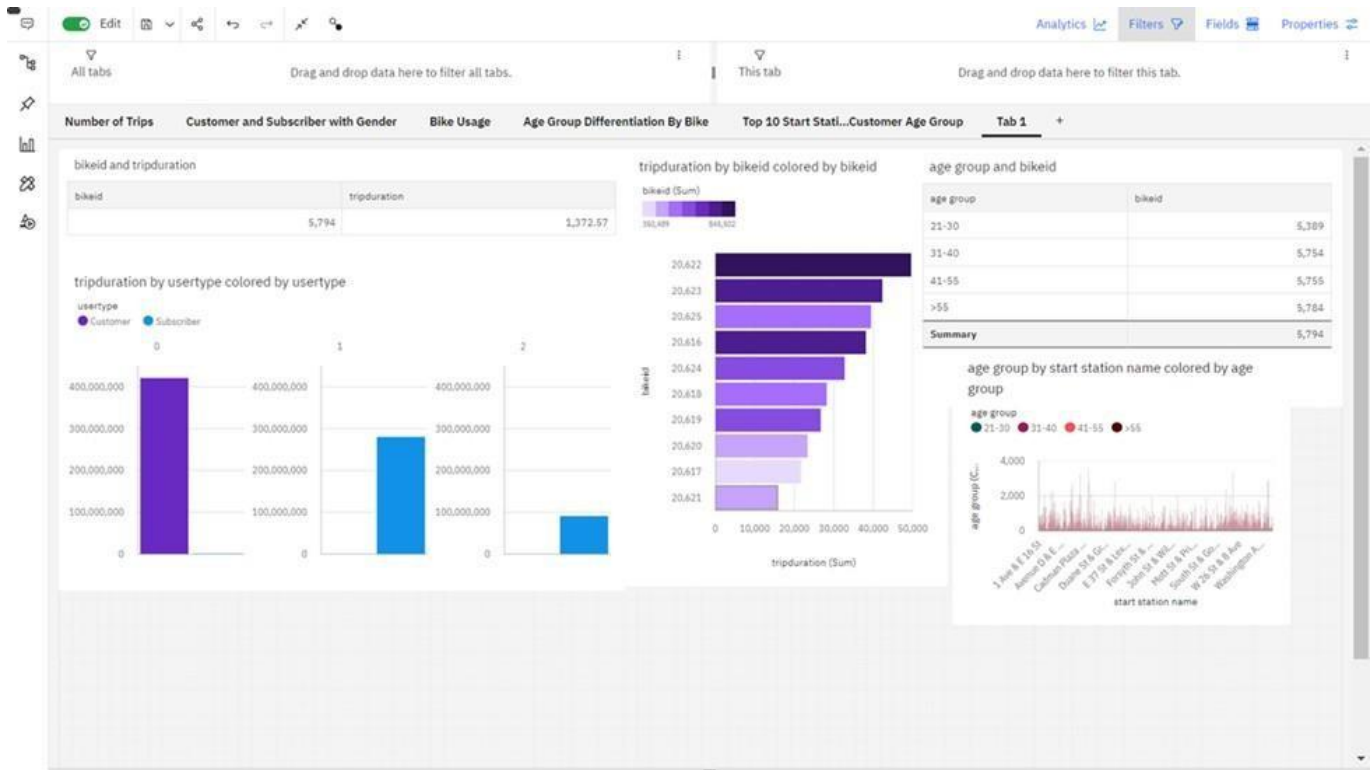
Top 10 Start Station Names with Respect to Customer Age Group:



Gender Variation



8. CREATING THE DASHBOARD



9. ADVANTAGES AND DISADVANTAGES

The benefits of bike sharing schemes include transport flexibility, reductions to vehicle emissions, health benefits, reduced congestion and fuel consumption, and financial savings for individuals.

One can easily analyze and understand trends in bike sharing patterns with the created dashboard. With no prior skills and knowledge about the tools that we use for analysis, anyone (literate or illiterate) can easily infer the knowledge that we represent in various charts or graphs or maps. So that it would be helpful to users and companies to make appropriate decisions in the future.

10. CONCLUSION

Based on the quantitative as well as visual analysis of the New York bike share system, a number of interesting insights were gained.

One obvious conclusion was that there is a strong seasonal variation in the system usage with maximum usage in summer and minimum usage in winter. This was initially hypothesized because of the harshness of New York's harsh winters and the treacherous riding conditions that exist during that time. However, despite the adverse weather conditions, there is a strong core demographic that consistently uses the system. This conclusion is based on that fact that even during the months of January and February which are the peak winter months, there are more than two hundred thousand trips in the system.

New York has a strong public transit system, and the bike share system seems to complement it quite well with a majority of the highest used stations located either close to subway lines or the commuter rail stations in the city.

Based on the locations of the stations and the duration of trips, it can be hypothesized that bike shares are replacing last mile trips that would otherwise be done either on foot or on public transit. This is particularly true in case of New York where a combination of dense public transit network, the road congestion during peak hours and the average trip distance as calculated create a situation where the only potential trips that the bike share system is replacing currently are those that would otherwise have been undertaken either on foot or on public bus.

11.FUTURE SCOPE

NYC is a very crowded and happening place which leads to lots of pollution. And in this busy world people are always worried about transportation this bike sharing system reduces that stress. With increase in population pollution also increases. So it is in our hands to reduce pollution and to make a better future for our younger generations. We can analyze which station needs more bikes and any area needs new station to be installed. The survey outcomes indicates the needs for improved techniques in bike sharing analytics. There exists a lot of scope in this research area.

12.SOURCE CODE

```
### md

# SPRINT **3**

###

import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
import plotly.express as px
from datetime import datetime
from pprint import pprint

from pydrive.auth import GoogleAuth
from pydrive.drive import GoogleDrive
from google.colab import auth
from oauth2client.client import GoogleCredentials

###

path = "/content/dataset.csv"
df = pd.read_csv(path)
print(df)

###

df.head()

###

df.describe()

###

df.info()

###

df.isnull().sum()

###

df[df['starttime'].isnull()]

###

df[df['stoptime'].isnull()]

###

df = df[:-1]

###

df.isnull().sum()
```

```
###
```

```
print(type(df["start station latitude"][0]))  
print(df["start station latitude"][0])
```

```
###
```

```
df['start station name'].unique()
```

```
###
```

```
def camel_case(city):  
    try:  
        city = city.split(' ')  
        city = ' '.join([x.lower().capitalize() for x in city])  
        if city == 'Unknown':  
            return np.nan  
        else:  
            return city  
    except:  
        return np.nan
```

```
# Apply camel case function to City column  
df['start station name'] = df['start station name'].apply(camel_case)  
df['start station name'].value_counts()
```

```
###
```

```
df.count()
```

```
###
```

```
df["tripduration"] = pd.to_numeric(df["tripduration"])  
res = df.iloc[52323]  
print(res["tripduration"])
```

```
###
```

```
df_filtered = df[df['tripduration'] != "tripduration"]  
df_filtered["tripduration"] = pd.to_numeric(df_filtered["tripduration"])
```

```
df = df_filtered  
type(df["tripduration"][0])
```

```
###
```

```
type(df["start station latitude"][0])
```

```
###
```

```
type(df["end station longitude"][0])
```

```
###
```

```
type(df["bikeid"][0])
```

```
###
```

```
type(df["birth year"][0])
```

```
###
```



```

type(df["gender"][0])

###

type(df["starttime"][0])

###

df["starttime"] = pd.to_datetime(df["starttime"])
df["stoptime"] = pd.to_datetime(df["stoptime"])
type(df["starttime"][0])

###

df["starttime"][0] < df["stoptime"][0]

###

df.info()

###

def find_outliers_IQR(df):
    q1=df.quantile(0.25)
    q3=df.quantile(0.75)
    IQR=q3-q1
    outliers = df[((df<(q1-1.5*IQR)) | (df>(q3+1.5*IQR)))]
    return outliers
outliers = find_outliers_IQR(df["birth year"])
print("number of outliers: " + str(len(outliers)))
print("max outlier value: " + str(outliers.max()))
print("min outlier value: " + str(outliers.min()))

###

df["gender"].value_counts()

###

temp_df = df[df["birth year"] <= 1957]
temp_df["gender"].value_counts()

###

df.shape

###

df.to_csv('cleaned_dataset.csv', index=False)

### md

# **SPRINT 4**

###

path = "/content/cleaned_dataset.csv"
edadf = pd.read_csv(path)
print(edadf)

```

```

#%%

temp = edadf

#%%

temp.head()

#%%

temp.describe()

#%%

temp.info()

#%%

temp["starttime"] = pd.to_datetime(temp["starttime"])
temp["stoptime"] = pd.to_datetime(temp["stoptime"])
temp.info()
temp["Hour"] = temp["stoptime"].dt.hour - temp["starttime"].dt.hour
temp.head()

#%%

temp.shape

#%%

temp['Age'] = 2022 - temp['birth year']
temp.head()

#%%

Age_Groups = ["<20", "20-29", "30-39", "40-49", "50-59", "60+"]
Age_Groups_Limits = [0, 20, 30, 40, 50, 60, np.inf]
Age_Min = 0
Age_Max = 100
temp["Age_group"] = pd.cut(temp["Age"], Age_Groups_Limits, labels=Age_Groups)
temp.head()

#%%

trips_df = pd.DataFrame()
trips_df = temp.groupby(['start station name', 'end station
name']).size().reset_index(name = 'Number of Trips')
trips_df = trips_df.sort_values('Number of Trips', ascending = False)
trips_df["start station name"] = trips_df["start station name"].astype(str)
trips_df["end station name"] = trips_df["end station name"].astype(str)
trips_df["Routes"] = trips_df["start station name"] + " to " + trips_df["end
station name"]
trips_df = trips_df[:50]
trips_df = trips_df.reset_index()
trips_df

#%%

px.pie(values = temp['gender'].value_counts(),
names =temp['gender'].value_counts().index,
title ="Gender Variation")

#%%

```

```
px.bar(x=temp["start station name"].value_counts().index,  
       y=temp["start station name"].value_counts().values,  
       labels={'x': 'Start Station Name', 'y': 'Count'})
```

```
###
```

```
px.bar(x=temp["end station name"].value_counts().index,  
       y=temp["end station name"].value_counts().values,  
       labels={'x': 'End Station Name', 'y': 'Count'})
```

```
###
```

```
px.bar(x=temp["Hour"].value_counts().index,  
       y=temp["Hour"].value_counts().values,  
       title = "Hour usage of Citi Bikes",  
       labels={'x': 'Time', 'y': 'Number of people using bike'})
```

13.GITHUB LINK

<https://github.com/IBM-EPBL/IBM-Project-10754-1659201732>

14.OUTPUT DEMO LINK

[https://drive.google.com/file/d/1wSmFrMOOsus5Mfzgo1a09MPjxr6DUHvHE/view?usp=share
link](https://drive.google.com/file/d/1wSmFrMOOsus5Mfzgo1a09MPjxr6DUHvHE/view?usp=share_link)