Churn Analytics

Low Level Design

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DOCUMENT VERSION CONTROL

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CHURN ANALYTICS

1. Introduction

1.1 What is Low-Level Design Document?

The Low-Level Design Document (LLD), also known as an LLDD, aims to provide the core logic design of the actual computer code for the dashboard. Class diagrams with methods and relationships between classes and Programme specifications are described using LDD. In order for the programmer to create the programme directly from the document, it describes the modules

1.2 Scope

Low-Level Design is a component level design process that uses a sequential process of refinement. Data structures, necessary software architecture, source code and finally performance algorithms can all be designed using this method. Overall, during requirement analysis, the data organization may be created and then refined during data design work

2. Architecture
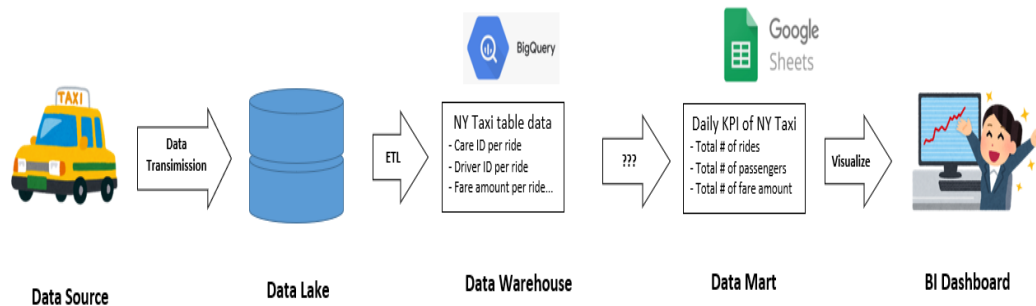
3.Description

3.1 Problem Statement

A business is dealing with client attrition. The main goal is to precisely evaluate the customers' churning rate and churned customers count and the factors responsible for it in order to help the business gain insights into the services that it needs to improve

3.2 Data Collection

The dataset of the company is provided in the form of Excel workbook.

3.3 Data Description

The dataset contains the following columns:

- Agency
- Commendation or Complaint
- Subject Matter
- Subject Detail
- Issue Detail
- Year
- Quarter
- Branch/Line/Route

3.4 Data Transformation

The null values of the Issue Detail column have been replaced by the 'Unspecified' text. The duplicate entries are removed. In this way, the data has been cleaned.

3.5 Deployment

The Customers' Churn Analytics Dashboard created

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The various output using Jupyter notebook results are as follows:

1. COUNT OF RETAINED CUSTOMER(COMMENDATION) ¶

```
[35]: retained_customr_count=df[df['Commendation or Complaint']=='Commendation'].shape[0]
```

```
[36]: print(f"Retained_Customer_Count:{retained_customr_count}")
```
Retained_Customer_Count:3984

2. CHURN RATE OF CUSTOMER

```
[37]: churned_customer_count=df[df['Commendation or Complaint']=='Complaint'].shape[0]
```

```
[38]: total_customer=df.shape[0]
```

```
[39]: churn_rate=round((churned_customer_count / total_customer)*100,2)
```

```
[40]: print(f'CHURN RATE : {churn_rate}%')
```
CHURN RATE : 95.38%

3. COUNT OF CHURNED CUSTOMERS(COMPLAINT)

```
[41]: print(f'CHURNED CUSTOMER COUNT:{churned_customer_count}')
```
CHURNED CUSTOMER COUNT:82231

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4.AGENCY WITH MOST COMPLAINTS

```
[42]: agency_complaints=df[df['Commendation or Complaint']=='Complaint'].groupby('Agency').size().reset_index(name='agency count').sort_values(by='agency coun
```

```
[43]: agency_complaints
```

[43]:

	Agency	agency count
2	NYC Buses	47781
3	Subways	21401
0	Long Island Rail Road	8231
1	Metro-North Railroad	4818

5. COMMON SUBJECT MATTERS(COMPLAINT)

```
14]: subject_matter_complaints=df[df['Commendation or Complaint']=='Complaint'].groupby('Subject Matter').size().reset_index(name='count of customer').sort_va
```

```
15]: subject_matter_complaints
```

15]:

	Subject Matter	count of customer
4	Employees	34314
12	Station /Bus Stop /Facility /Structure	15876
15	Travel Disruption / Trip Problem	12704
0	Buses	5795
14	Trains	5613
13	Telephone / Website / Mobile Apps	2258
8	Policies, Rules & Regulations	2111
11	Schedules / Reservations	1376
7	MetroCard/Tickets/E-Zpass & Tolls	1346
3	Customer	668
6	MTA Agency Cars / Trucks	101
2	Construction / Capital Projects	35
9	Public Hearing	17
10	Reasonable Modification	9
5	Ferry Service - Hudson River	7
1	Complaint	1

6. Common Subject Details (Complaint)

```
[46]: Subject_Details_Complaint=df[df['Commendation or Complaint']=='Complaint'].groupby('Subject Detail').size().reset_index(name='subject_details').sort_v
```

```
[47]: Subject_Details_Complaint
```

[47]:

	Subject Detail	subject_details
17	Bus Operator / Driver	26957
15	Bus / Vehicle - General	12335
93	Rail / Subway Cars	4015
112	Station - General	2994
125	Train - General	2974
...	...	...
40	Equal Employment Opportunity	1
24	Call Ahead Service	1
12	Bikes-Per-Car Restrictions	1
33	Deferred Toll Payment	1
96	Resident Discount - Other	1

139 rows × 2 columns

7. Common Issue Details (Complaint)

```
[48]: Issue_Details_Complaint=df[df['Commendation or Complaint']=='Complaint'].groupby('Issue Detail').size().reset_index(name='issue').sort_values(by='issue',
```

```
[49]: Issue_Details_Complaint
```

[49]:

	Issue Detail	issue
217	unspecified	4963
142	Other	4372
162	Rude / Inappropriate Language	3689
89	Improper Function/Needs Repair/Damaged	3329
103	Late / Delay	3185
...	...	...
132	Not Seen/Not Available	1
177	Ticket / Permit Suspended	1
197	Trip Cancelled	1
200	User Friendly	1
216	other	1

218 rows × 2 columns

8. Year-wise Trend of Customers

```
[50]: Year_wise_Trend=df.groupby('Year').size().reset_index(name='year').sort_values(by='year',ascending=False)
```

```
[51]: Year_wise_Trend
```

[51]:

	Year	year
1	2015	35455
2	2016	28302
0	2014	12956
3	2017	9502

9. Quarter-wise Trend of Churned Customers (Complaint)

```
[52]: quarter_wise_churned_complaint=df[df['Commendation or Complaint']=='Complaint'].groupby('Quarter').size().reset_index(name='quartely_complaint').sort_val
```

```
[53]: quarter_wise_churned_complaint
```

[53]:

	Quarter	quartely_complaint
2	3	23814
3	4	23705
1	2	18176
0	1	16536

```
[54]: df.to_csv('C:/Users/omsin/OneDrive/Documents/df.csv', index=False)
```

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3.6 Insights

- The customers' churning rate is very high i.e. 95.38 %. The company may face a huge loss, if it doesn't tackle the problem on urgent basis.
- The NYC Buses agency has the maximum number of complaints, followed by Subways. These agencies are not providing good services to the customers.
- Mostly customers are disappointed with the Employees and Station/Bus Stop/Facility/structure services. These need to be tackled in order to decrease the churning rate of customers.
- Mostly customers face problems with the Bus Operator or Driver and Vehicles.
- Specifically, the customers get bothered by the rude behaviour or inappropriate language used by the drivers and malfunctioning of the vehicles, other than the reasons unspecified. The company should seriously take action against such drivers and also repair the malfunctioned vehicles in order to increase the customer retention rate.
- It is clear that the customers are not liking the services since year 2015 as the number of customers starts decreasing since year 2015. The number of customers drastically decreases in the year 2017. The customers count in the year 2017 became even lesser than half of the count in the year 2016. The maximum churning of customers has taken place in the year 2017.
- The maximum churning of customers has taken place in the 3rd and 4th quarters (approximately 25% in each quarter)

4. Unit Test Cases

TEST CASE DESCRIPTION	EXPECTED RESULTS
Agency-wise Feedbacks	The chart provides the distribution of complaints and commendations in different agencies.
Common Subject Matters	The chart depicts the common subject matters of the customers.
Common Subject Details	The chart displays the common subject details of the customers
Customers' Churning Rate	This KPI indicates the rate at which the customers are churning from the business.
Common Issue Details	The chart shows the common issue details of the customers.
Churned Customers Count	This KPI indicates the count of churned customers