hdm-report

May 17, 2024

```
[ ]: Dataset Description
```

```
[19]: import pandas as pd
      import seaborn as sns
      import matplotlib.pyplot as plt

      df= pd.read_excel('HDM.xlsx')
      df.fillna(0)
      df.head()
```

```
[19]:    Call Id  Lead Id  Campaign ID  Advertiser Id  \
      0    26807   410987       930228           1883
      1    26808   410986       930228           1883
      2    26809   410985       930228           1883
      3    26810   410984       930228           1883
      4    26811   410981       930228           1883

                                     Hid Call Status     Lead Status  \
      0  40831aceu6850re1ece43deeqf20a6o   no-answer  Not Interested
      1  3dc489fbg6850pe1ece43deewf20a6v   completed  Not Interested
      2  92d7bfbag6850se1ece43deevf20a6y   no-answer  Invalid Number
      3  3a9872eem6850oe1ece43deetf20a6m   completed  Not Interested
      4  3dde873bx6850je1ece43deehf20a6u   no-answer            Busy

         Agent Duration(seconds)  Customer Duration(seconds)  From Calling Number  \
      0                        8                           0         9.186570e+11
      1                       51                          34         9.186570e+11
      2                        9                           0         9.186570e+11
      3                       45                          25         9.186570e+11
      4                       45                           0         9.186570e+11

         To Calling Number  Attempt No          Created At          Updated At  \
      0       9.195528e+11           1 2024-04-01 11:35:19 2024-04-01 11:35:27
      1       9.172755e+11           1 2024-04-01 11:35:27 2024-04-01 11:36:19
      2       9.194307e+11           1 2024-04-01 11:36:19 2024-04-01 11:36:28
      3       9.183493e+11           1 2024-04-01 11:36:29 2024-04-01 11:37:15
      4       9.170547e+11           1 2024-04-01 11:37:14 2024-04-01 11:38:00
```

```
   Agent Id     Agent Name
0      2728  Mansi Jaiswal
1      2728  Mansi Jaiswal
2      2728  Mansi Jaiswal
3      2728  Mansi Jaiswal
4      2728  Mansi Jaiswal
```

[20]:
```
print("Datatype of each column :",df.info())
print("shape of the dataset is :",df.shape)
print("Summary statistics of each column:")
all_stats_value=df.describe()
print(all_stats_value.head())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 24623 entries, 0 to 24622
Data columns (total 16 columns):
 #   Column                      Non-Null Count  Dtype
---  ------                      --------------  -----
 0   Call Id                     24623 non-null  int64
 1   Lead Id                     24623 non-null  int64
 2   Campaign ID                 24623 non-null  int64
 3   Advertiser Id               24623 non-null  int64
 4   Hid                         24623 non-null  object
 5   Call Status                 24623 non-null  object
 6   Lead Status                 24623 non-null  object
 7   Agent Duration(seconds)     24623 non-null  int64
 8   Customer Duration(seconds)  24623 non-null  int64
 9   From Calling Number         24500 non-null  float64
 10  To Calling Number           24617 non-null  float64
 11  Attempt No                  24623 non-null  int64
 12  Created At                  24623 non-null  datetime64[ns]
 13  Updated At                  24623 non-null  datetime64[ns]
 14  Agent Id                    24623 non-null  int64
 15  Agent Name                  24623 non-null  object
dtypes: datetime64[ns](2), float64(2), int64(8), object(4)
memory usage: 3.0+ MB
Datatype of each column : None
shape of the dataset is : (24623, 16)
Summary statistics of each column:
            Call Id        Lead Id    Campaign ID  Advertiser Id  \
count  24623.000000   24623.000000   24623.000000   24623.000000
mean   39308.926898  432166.407018  930255.478252    1882.260529
min    26807.000000  342820.000000  930056.000000     367.000000
25%    33106.500000  425459.000000  930247.000000    1883.000000
50%    39302.000000  438267.000000  930264.000000    1883.000000
```

```
       Agent Duration(seconds)  Customer Duration(seconds)  \
count             24623.000000                24623.000000
mean                 35.938432                   12.986679
min                   0.000000                    0.000000
25%                  17.000000                    0.000000
50%                  33.000000                    0.000000

       From Calling Number  To Calling Number    Attempt No  \
count         2.450000e+04       2.461700e+04  24623.000000
mean          9.186570e+11       3.229973e+11      2.880721
min           9.186570e+11       9.000000e+00      1.000000
25%           9.186570e+11       8.787205e+09      1.000000
50%           9.186570e+11       9.661373e+09      2.000000

                          Created At                     Updated At  \
count                          24623                          24623
mean   2024-05-01 16:22:27.646184448  2024-05-01 16:23:20.568492544
min              2024-04-01 11:35:19            2024-04-01 11:35:27
25%       2024-04-16 14:35:17.500000            2024-04-16 14:35:53
50%              2024-05-09 19:09:05            2024-05-09 19:09:48

           Agent Id
count  24623.000000
mean    2764.284449
min        1.000000
25%     2728.000000
50%     2772.000000
```

[ ]:

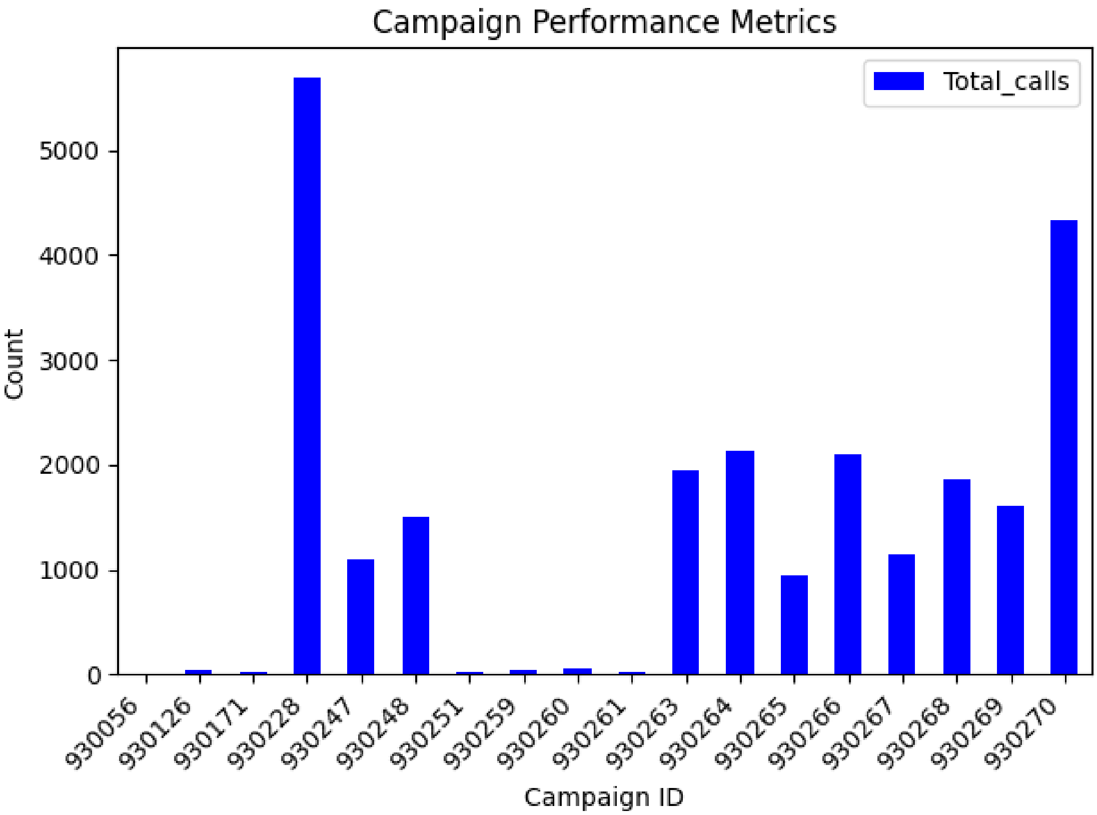
```
Campaign Performance Report
```

[20]:

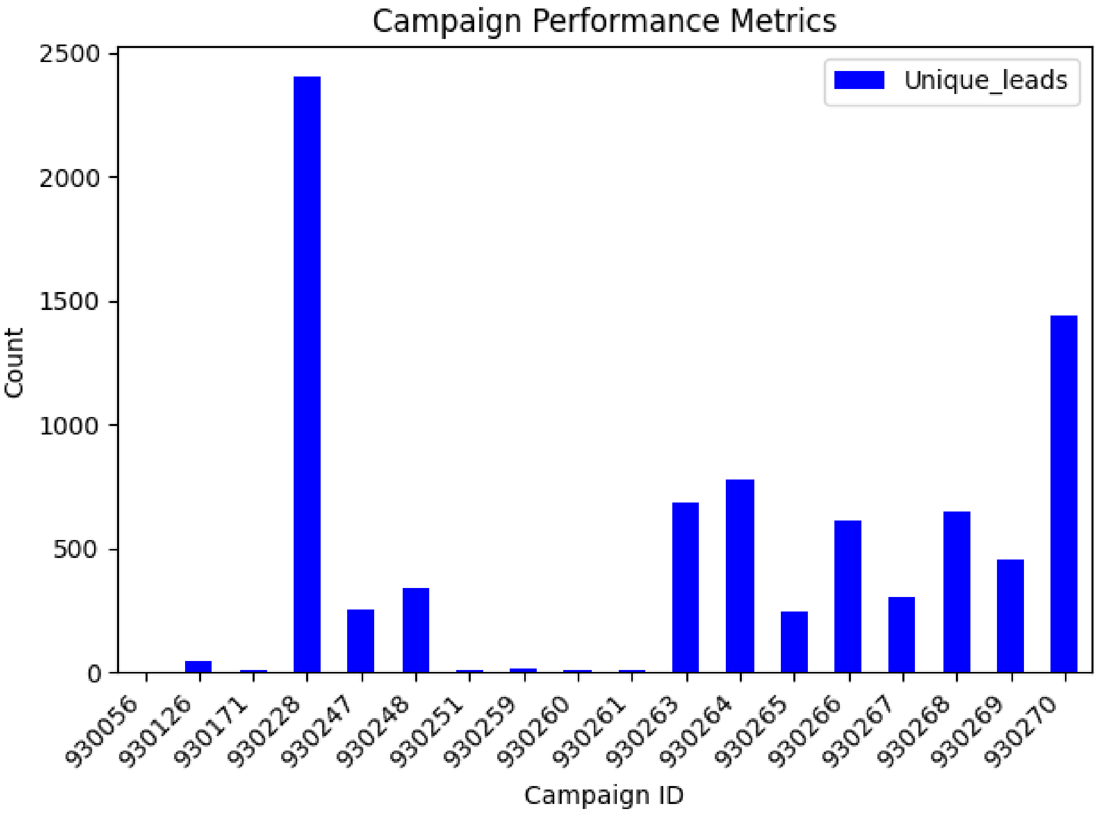
```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

df= pd.read_excel('HDM.xlsx')

campaign_data = df.groupby('Campaign ID').agg(Total_calls=('Call Id','count'),
    Unique_leads=('Lead Id', 'nunique'),
    calls_connected=('Call Status', lambda x:(x=='completed').sum()),
    Leads_converted=('Lead Status', lambda x: (x == 'Interested').sum()),
    Leads_lost=('Call Status', lambda x: (x == 'no-answer').sum()),
    Qualified_leads=('Advertiser Id', lambda x: (x > 20).sum()),
    Avg_agent_call_duration= ('Agent Duration(seconds)', 'mean'),
    Avg_customer_call_duration=('Customer Duration(seconds)', 'mean')).
 ↪reset_index()
```

```
campagin_columns=['Total_calls','Unique_leads','calls_connected','Leads_converted','Leads_lost
 ↪'Avg_customer_call_duration']
for columns in campagin_columns:
    plt.figure(figsize=(16,12))
    campaign_data.plot(kind='bar', x='Campaign ID', y= columns,␣
 ↪stacked=True,color='blue')
    plt.xlabel('Campaign ID')
    plt.ylabel('Count')
    plt.title('Campaign Performance Metrics')
    plt.xticks(rotation=45, ha='right')
    plt.tight_layout()
    plt.show()
```

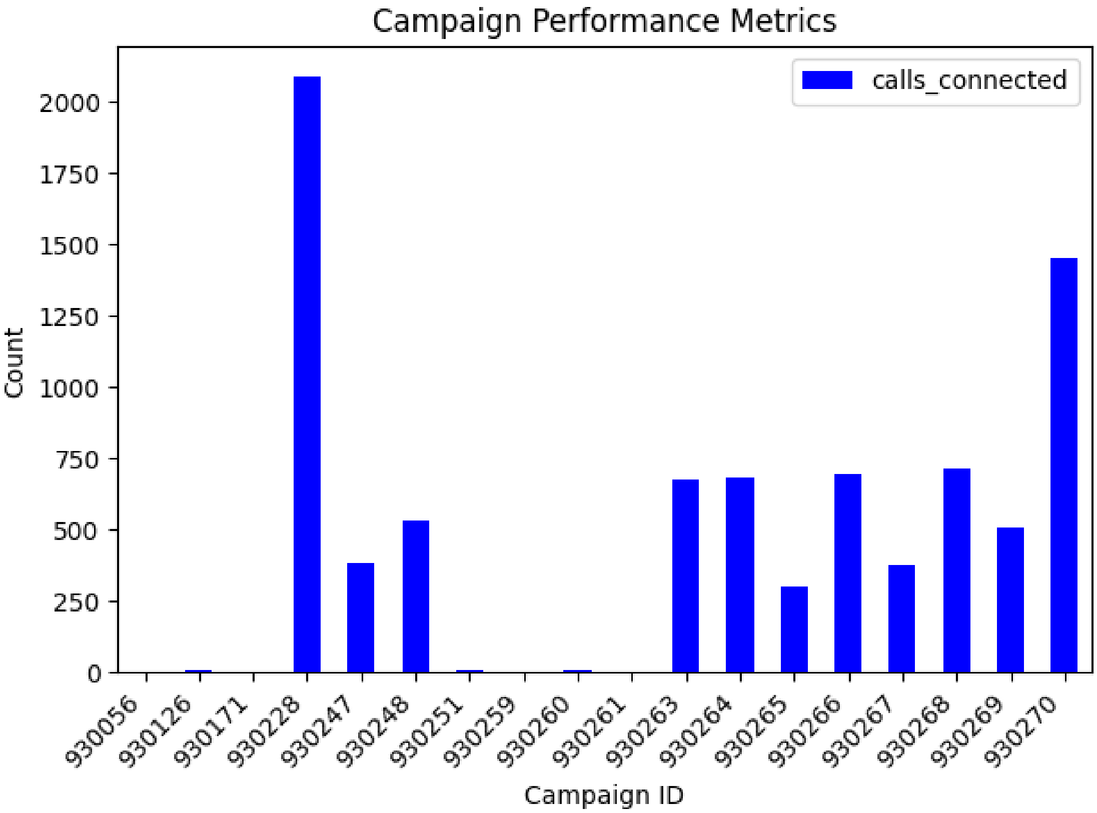
```
<Figure size 1600x1200 with 0 Axes>
```



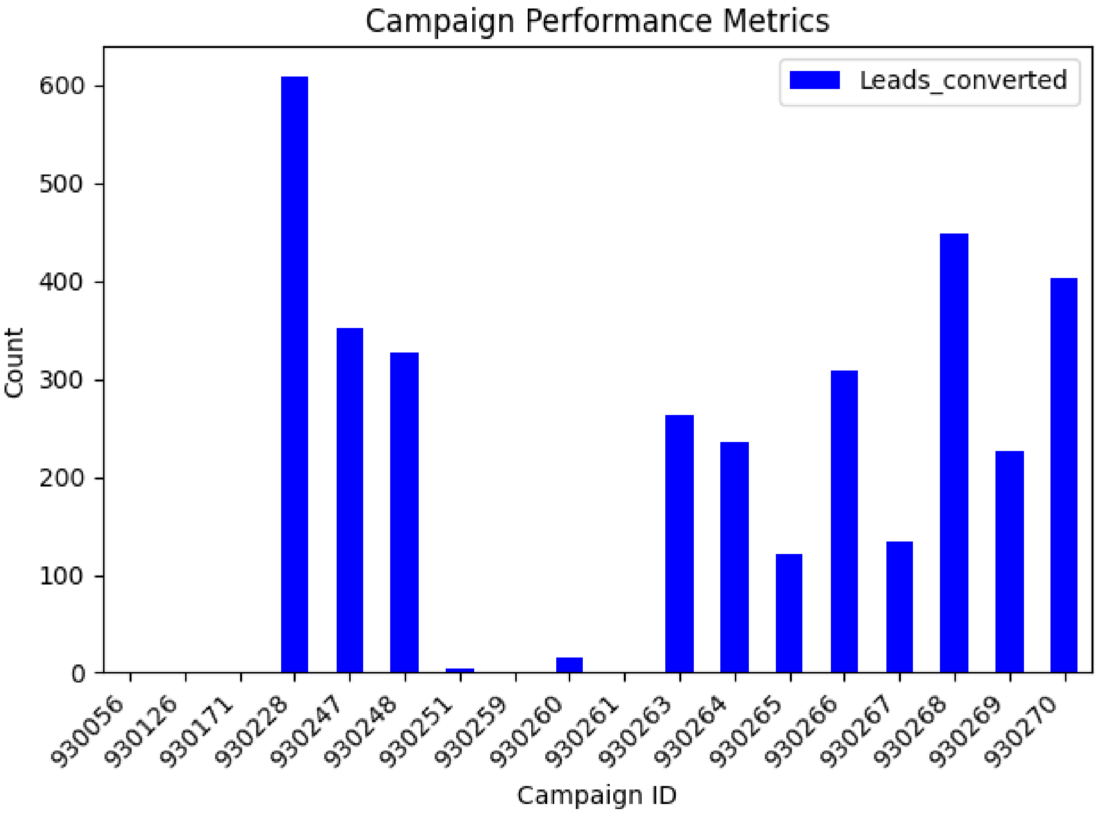
```
<Figure size 1600x1200 with 0 Axes>
```


Campaign Performance Metrics
Unique_leads
Count
2500
2000
1500
1000
500
0
930056
930126
930171
930228
930247
930248
930251
930259
930260
930261
930263
930264
930265
930266
930267
930268
930269
930270
Campaign ID

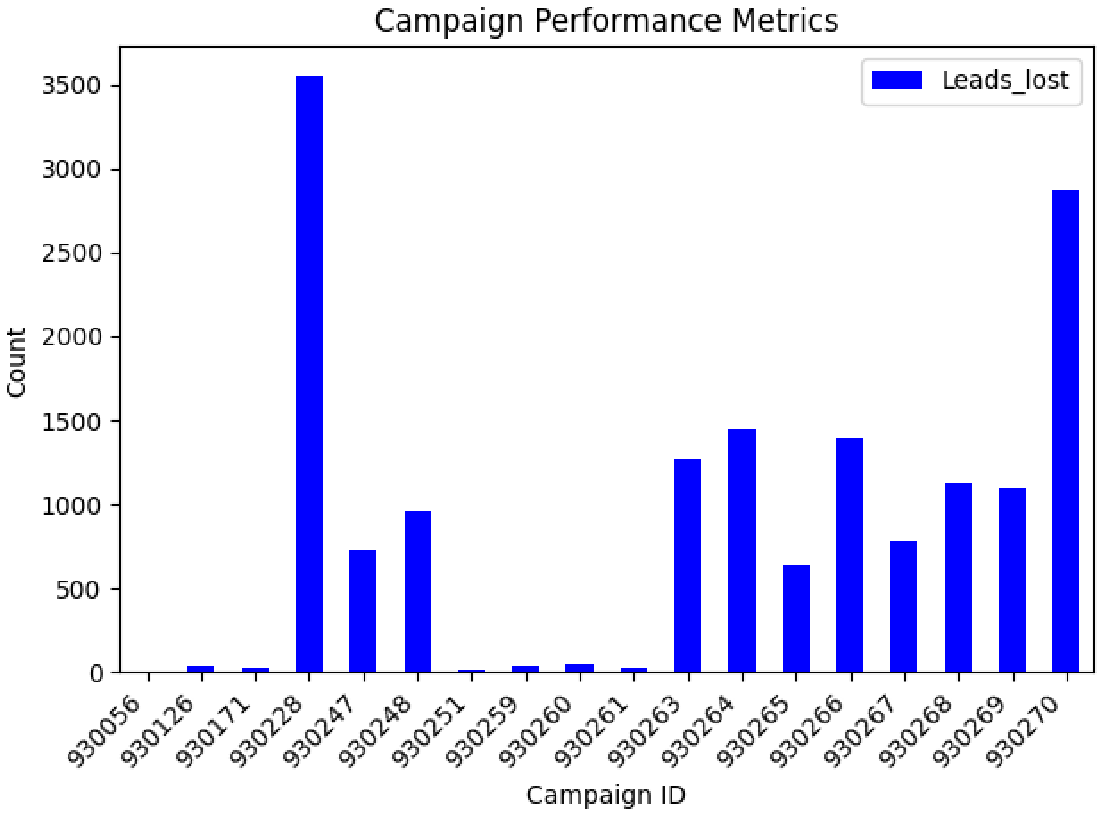
```
<Figure size 1600x1200 with 0 Axes>
```


Campaign Performance Metrics
calls_connected
Count
0
250
500
750
1000
1250
1500
1750
2000
930056
930126
930171
930228
930247
930248
930251
930259
930260
930261
930263
930264
930265
930266
930267
930268
930269
930270
Campaign ID

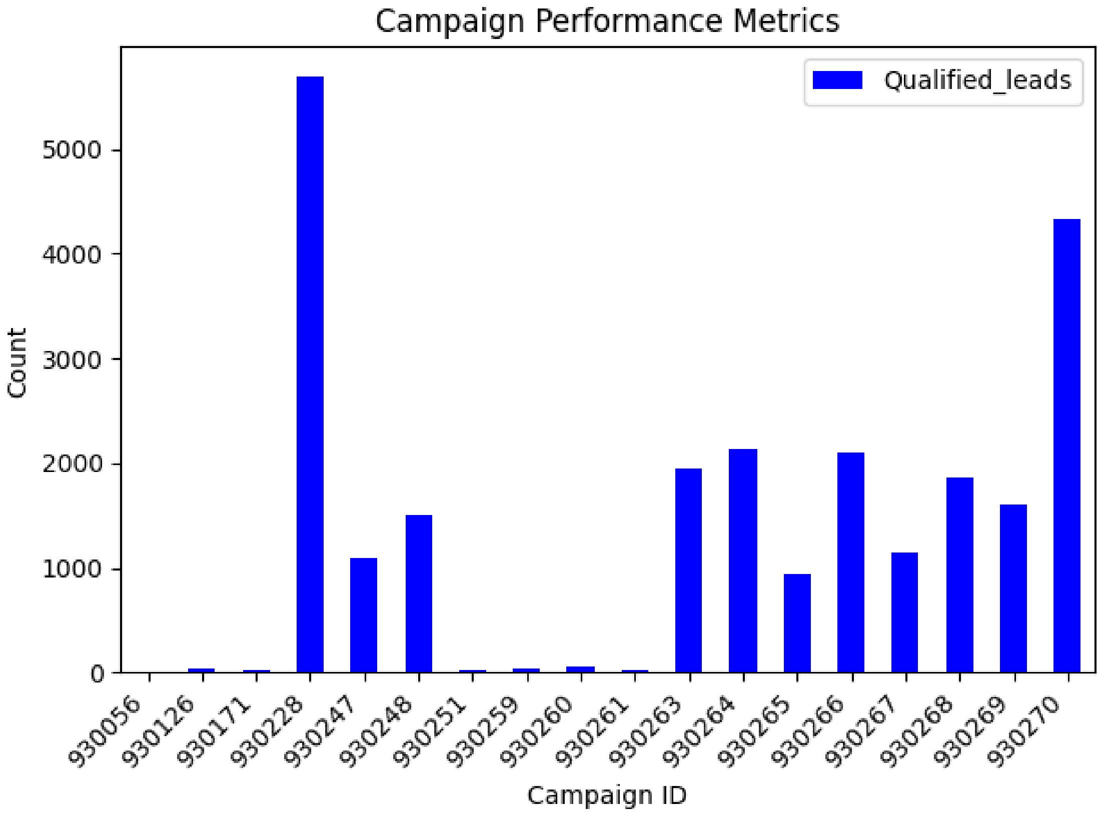
```
<Figure size 1600x1200 with 0 Axes>
```


Campaign Performance Metrics
Leads_converted
Count
0
100
200
300
400
500
600
930056
930126
930171
930228
930247
930248
930251
930259
930260
930261
930263
930264
930265
930266
930267
930268
930269
930270
Campaign ID

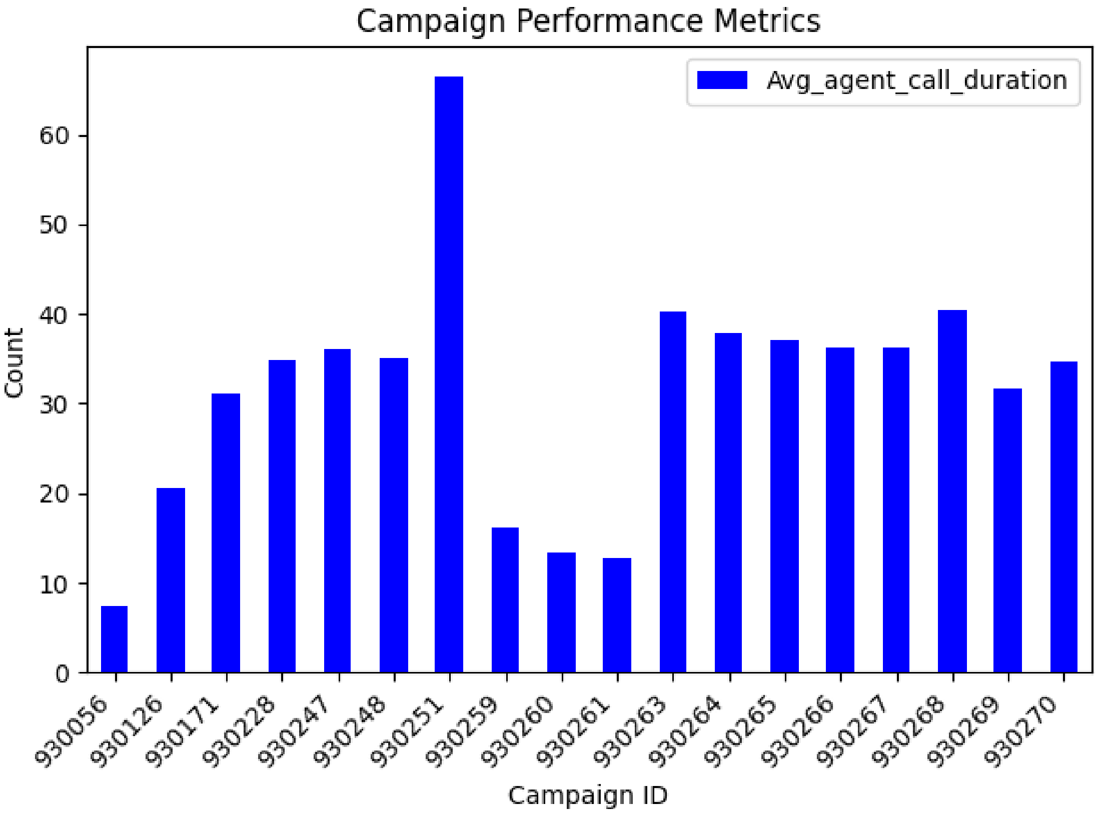
```
<Figure size 1600x1200 with 0 Axes>
```


Campaign Performance Metrics
Leads_lost
Count
0
500
1000
1500
2000
2500
3000
3500
930056
930126
930171
930228
930247
930248
930251
930259
930260
930261
930263
930264
930265
930266
930267
930268
930269
930270
Campaign ID

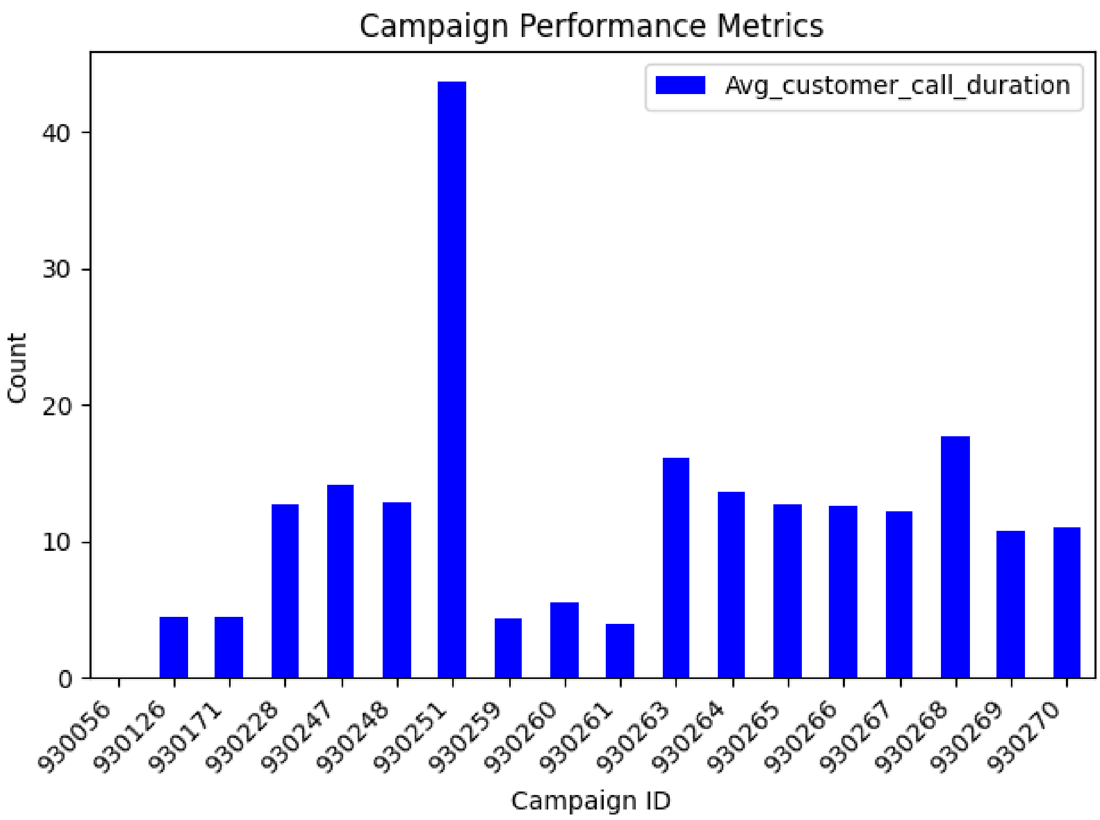
```
<Figure size 1600x1200 with 0 Axes>
```


Campaign Performance Metrics
Qualified_leads
Count
0
1000
2000
3000
4000
5000
Campaign ID
930056
930126
930171
930228
930247
930248
930251
930259
930260
930261
930263
930264
930265
930266
930267
930268
930269
930270

```
<Figure size 1600x1200 with 0 Axes>
```


Campaign Performance Metrics
Avg_agent_call_duration
Count
0
10
20
30
40
50
60
Campaign ID
930056
930126
930171
930228
930247
930248
930251
930259
930260
930261
930263
930264
930265
930266
930267
930268
930269
930270

```
<Figure size 1600x1200 with 0 Axes>
```



```
[ ]: Summary
Metrics:
Total Calls (Total_calls):
This metric indicates the total number of calls made for each campaign.
It reflects the campaign's outreach efforts and activity level.

Unique Leads (Unique_leads):
Represents the number of unique leads generated by each campaign.
It measures the campaign's ability to attract unique individuals or entities.

Calls Connected (calls_connected):
Shows the number of calls that were successfully connected, i.e., calls with a status of "completed".
It measures the campaign's effectiveness in reaching and connecting with the target audience.

Leads Converted (Leads_converted):
Indicates the number of leads that have converted to "Interested" status.
It signifies the campaign's success in generating interest or engagement among leads.
```

```
Leads Lost (Leads_lost):
Represents the number of calls where the lead status changed to "no-answer".
It reflects the number of potential leads that were not successfully engaged.

Qualified Leads (Qualified_leads):
Shows the number of leads that have been qualified based on the criterion of␣
 ↪having an Advertiser Id greater than 20.
It provides insights into the number of promising leads generated by each␣
 ↪campaign.

Average Agent Call Duration (Avg_agent_call_duration):
This metric calculates the average duration of agent-side calls for each␣
 ↪campaign.
It gives an indication of the average time agents spent on calls related to the␣
 ↪campaign.

Average Customer Call Duration (Avg_customer_call_duration):
Represents the average duration of customer-side calls for each campaign.
It provides insights into the average duration of interactions from the␣
 ↪customer's perspective.
```

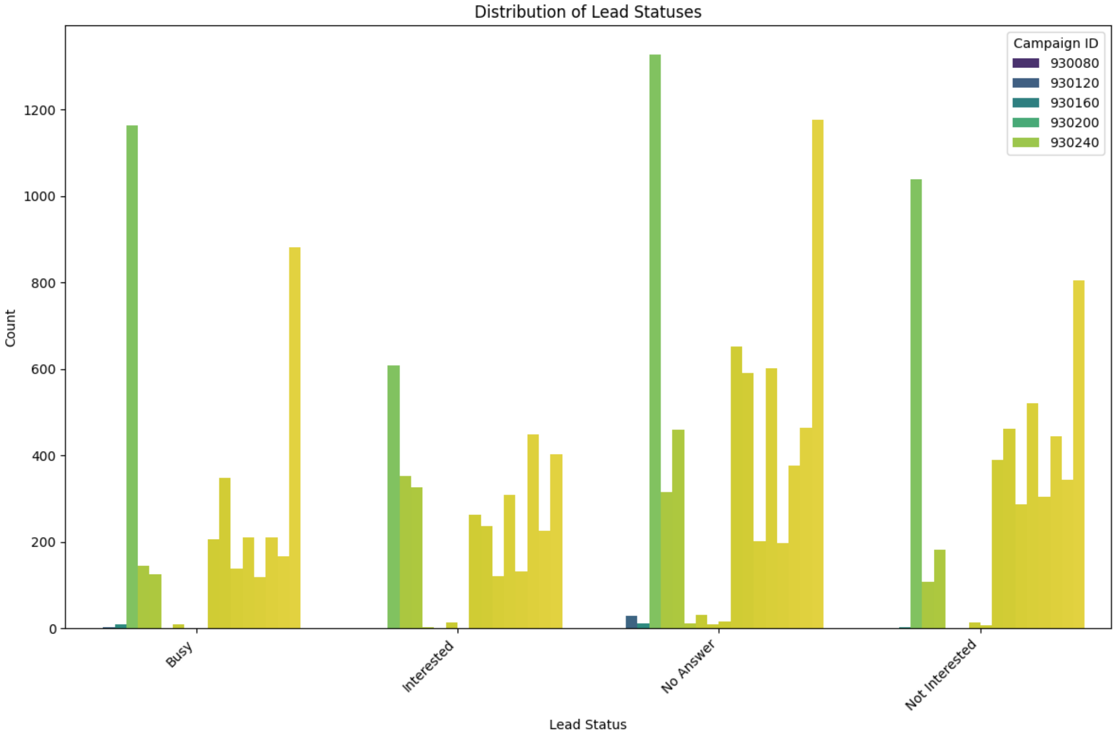
[ ]:

```
Lead Disposition Report
```

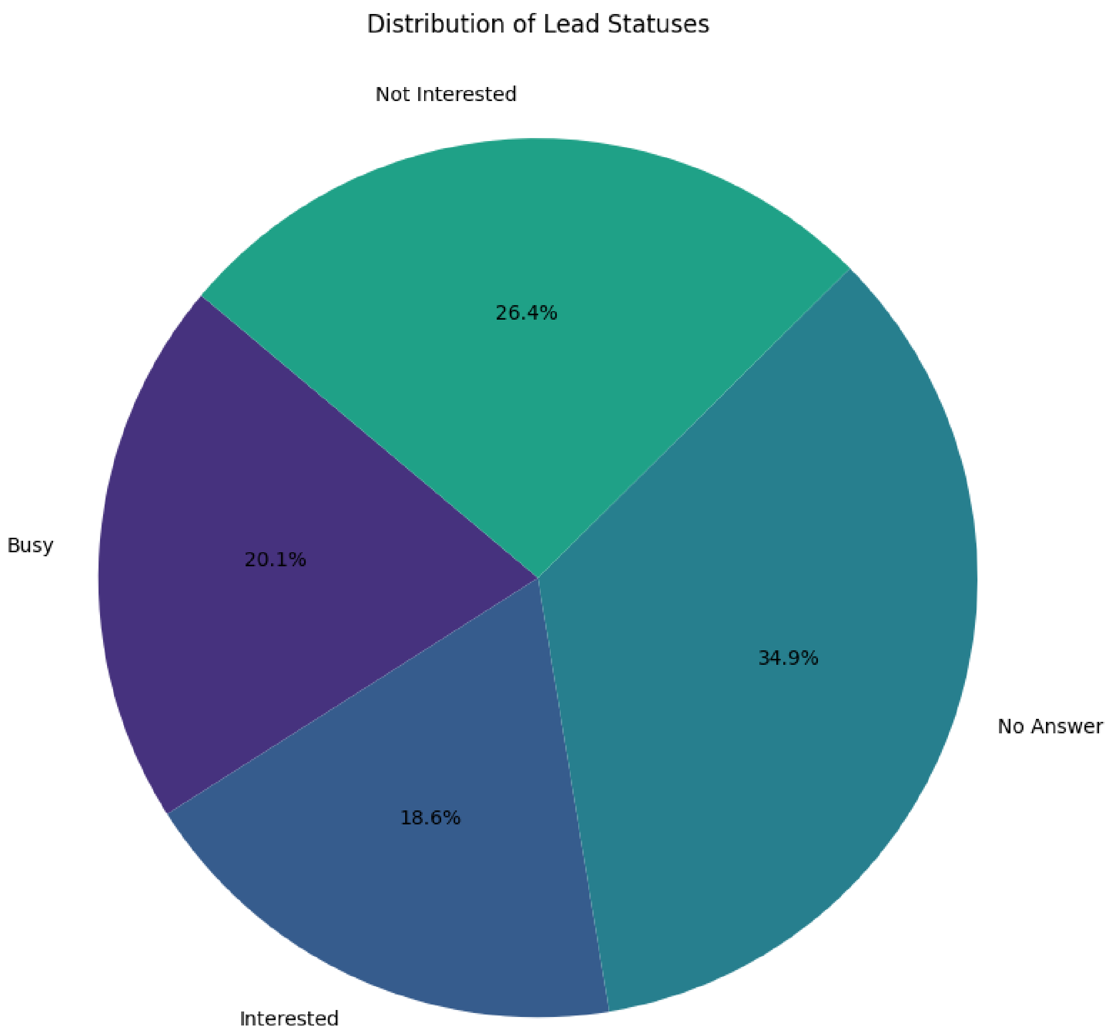
[61]:

```python
call_data = df[df['Lead Status'].isin(['Interested', 'Not Interested', 'Not␣
 ↪Answered', 'Busy'])]

call_status = ['Interested', 'Not Interested', 'No Answer', 'Busy']
call_data = df[df['Lead Status'].isin(call_status)]



lead_report = call_data.groupby(['Lead Status', 'Campaign ID']).size().
 ↪reset_index(name='Count')

lead_counts = lead_report.groupby('Lead Status')['Count'].sum()

# Display the aggregated data
print(lead_report)

# Plotting the distribution of call statuses
plt.figure(figsize=(12, 8))
sns.barplot(x='Lead Status', y='Count',hue= 'Campaign ID', data=lead_report,␣
 ↪palette='viridis')
plt.xlabel('Lead Status')
plt.ylabel('Count')
plt.title('Distribution of Lead Statuses')
plt.xticks(rotation=45, ha='right')
plt.tight_layout()
plt.show()


# Plotting a pie chart
plt.figure(figsize=(8, 8))
plt.pie(lead_counts, labels=lead_counts.index, autopct='%1.1f%%',␣
 ↪startangle=140, colors=sns.color_palette('viridis'))
plt.title('Distribution of Lead Statuses')
plt.axis('equal')
plt.tight_layout()
plt.show()

print(lead_report)
```

```
       Lead Status  Campaign ID  Count
0             Busy       930126      3
1             Busy       930171     10
2             Busy       930228   1164
3             Busy       930247    145
4             Busy       930248    126
..             …          …    …
59  Not Interested       930266    520
60  Not Interested       930267    304
61  Not Interested       930268    444
62  Not Interested       930269    343
63  Not Interested       930270    806

[64 rows x 3 columns]
```



Distribution of Lead Statuses
Campaign ID
930080
930120
930160
930200
930240
Count
0
200
400
600
800
1000
1200
Busy
Interested
No Answer
Not Interested
Lead Status



```
       Lead Status  Campaign ID  Count
0             Busy       930126      3
1             Busy       930171     10
2             Busy       930228   1164
3             Busy       930247    145
4             Busy       930248    126
..             …            …     …
59  Not Interested       930266    520
60  Not Interested       930267    304
61  Not Interested       930268    444
62  Not Interested       930269    343
63  Not Interested       930270    806
```

```
[64 rows x 3 columns]
```

[ ]:

```
Interested Leads:

The bar plot shows that campaigns 21, 25, and 37 have the highest number of␣
  ↪interested leads.
These campaigns are likely targeting their audience effectively or offering␣
  ↪compelling products/services.

Not Interested Leads:
There is a noticeable variation in the number of leads not interested across␣
  ↪different campaigns.

No Answered Leads:
The analysis reveals a significant number of leads where the call was not␣
  ↪answered.
This could indicate issues with timing or lead availability, suggesting a need␣
  ↪for better contact strategies.

Busy Leads:
There is a smaller proportion of leads who were busy during the call attempts.
While not a major issue, optimizing call timing could improve contact rates␣
  ↪with busy leads.
```

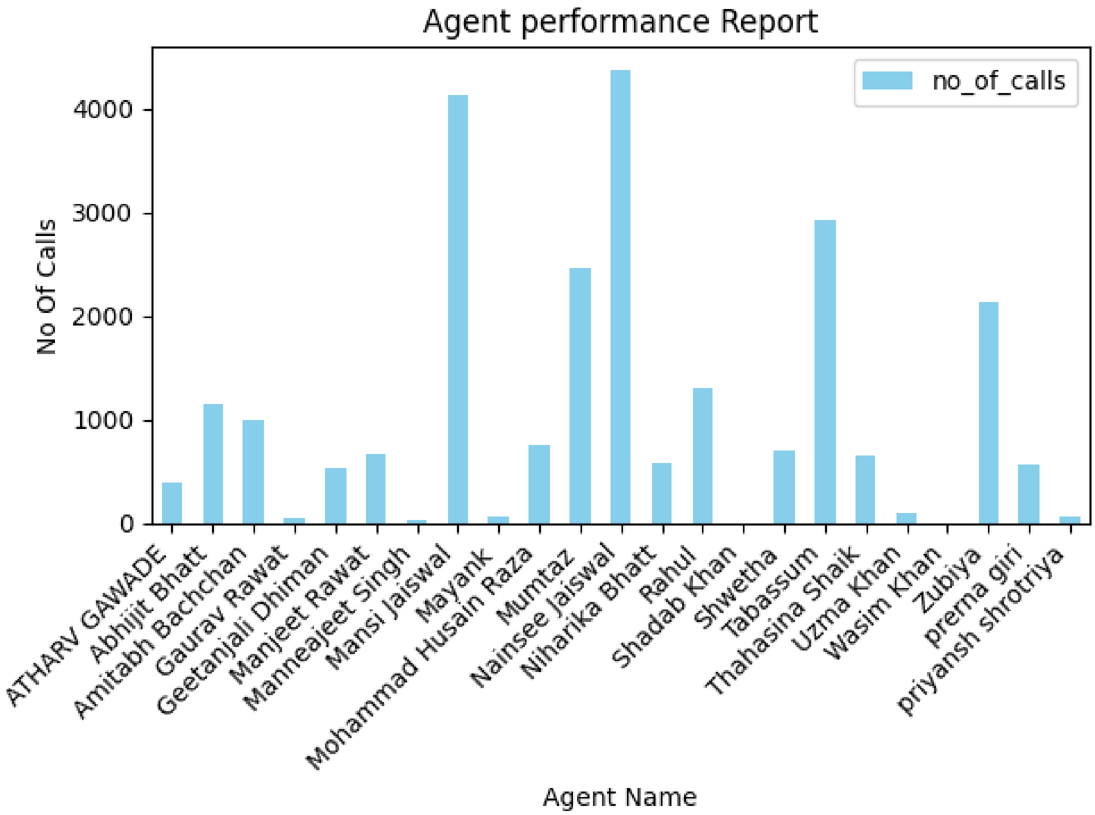
[ ]:

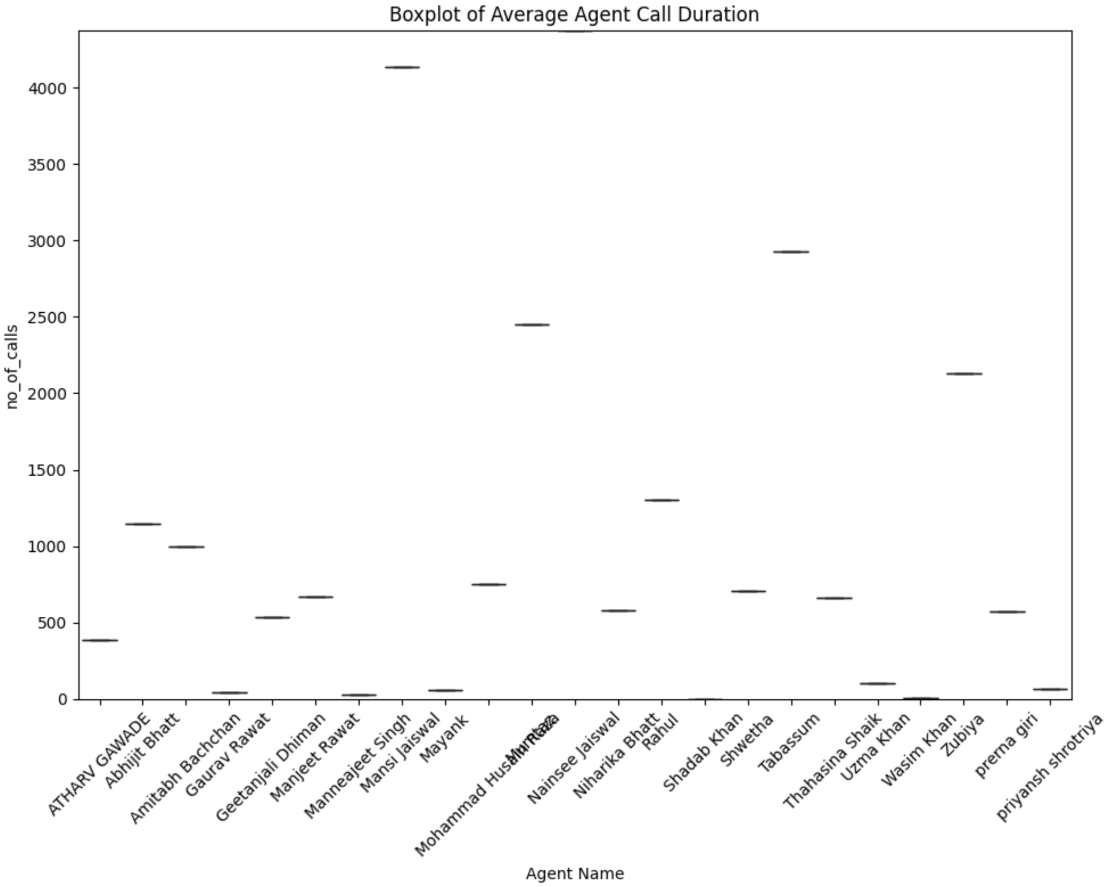
```
Agent performance Report
```

[68]:

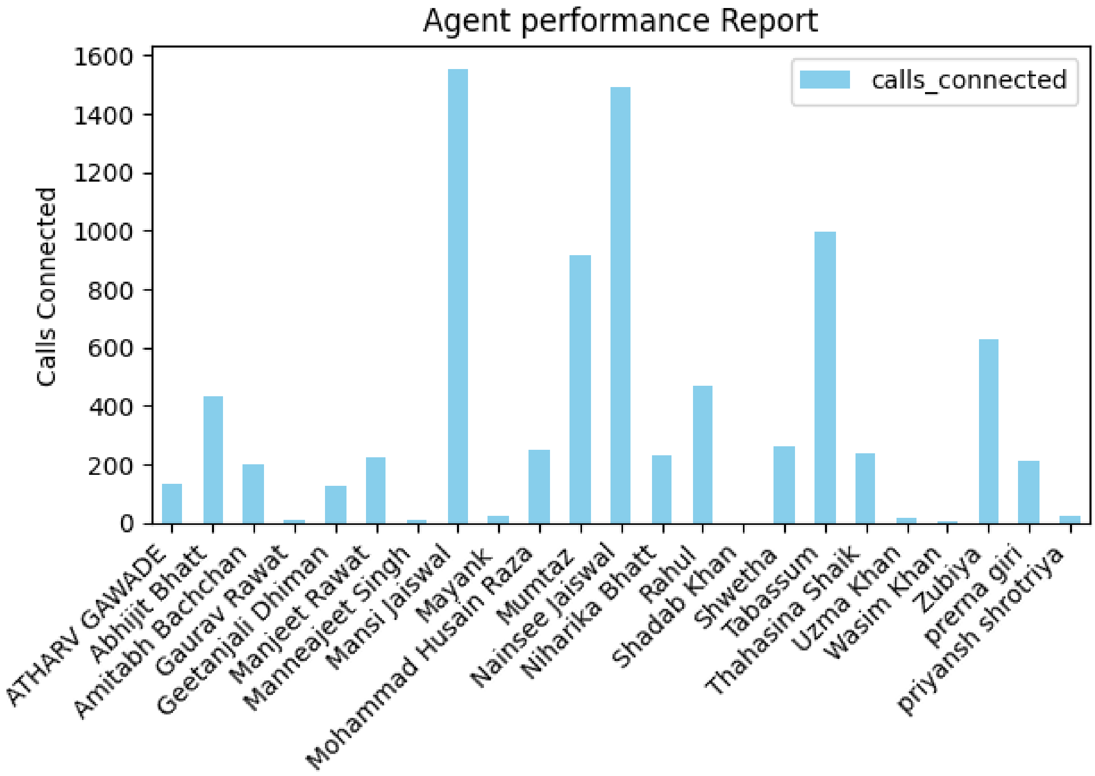
```
agent_performance= df.groupby('Agent Name').agg(no_of_calls=('Call Status',␣
  ↪'count'), calls_connected=('Call Status', lambda x:(x=='completed').sum()),
                                                      leads_converted=('Lead Status',␣
  ↪lambda x:(x=='Interested').sum()),  Avg_agent_call_duration= ('Agent␣
  ↪Duration(seconds)', 'mean'),
                                                  ␣
  ↪Avg_customer_call_duration=('Customer Duration(seconds)', 'mean')).
  ↪reset_index()

performance_columns=['no_of_calls', 'calls_connected','leads_converted',␣
  ↪'Avg_agent_call_duration','Avg_customer_call_duration']

for columns in performance_columns:
    plt.figure(figsize=(16,12))
    agent_performance.plot(kind="bar",x='Agent␣
  ↪Name',y=columns,stacked=True,color='skyblue')
    plt.title("Agent performance Report")
    plt.xlabel('Agent Name')
    plt.ylabel(columns.replace('_', ' ').title())
    plt.xticks(rotation=45, ha='right')
    plt.tight_layout()
    plt.show()

    plt.figure(figsize=(10, 8))
    sns.boxplot(x='Agent Name', y=columns, data=agent_performance,hue='Agent␣
↪Name', palette='viridis')
    plt.title('Boxplot of Average Agent Call Duration')
    plt.xlabel('Agent Name')
    plt.ylabel(columns)
    plt.ylim(0, agent_performance[columns].max())
    plt.xticks(rotation=45)
    plt.tight_layout()
    plt.show()


print(agent_performance)
```

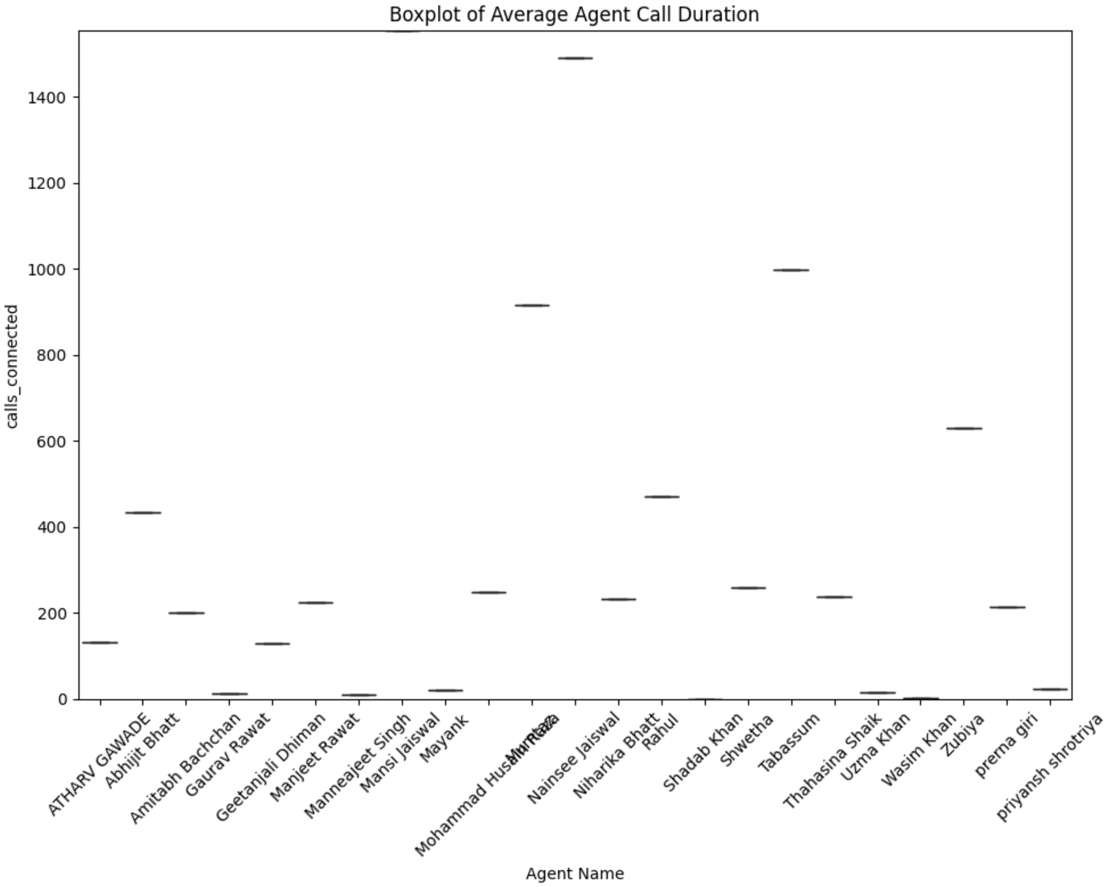
```
<Figure size 1600x1200 with 0 Axes>
```



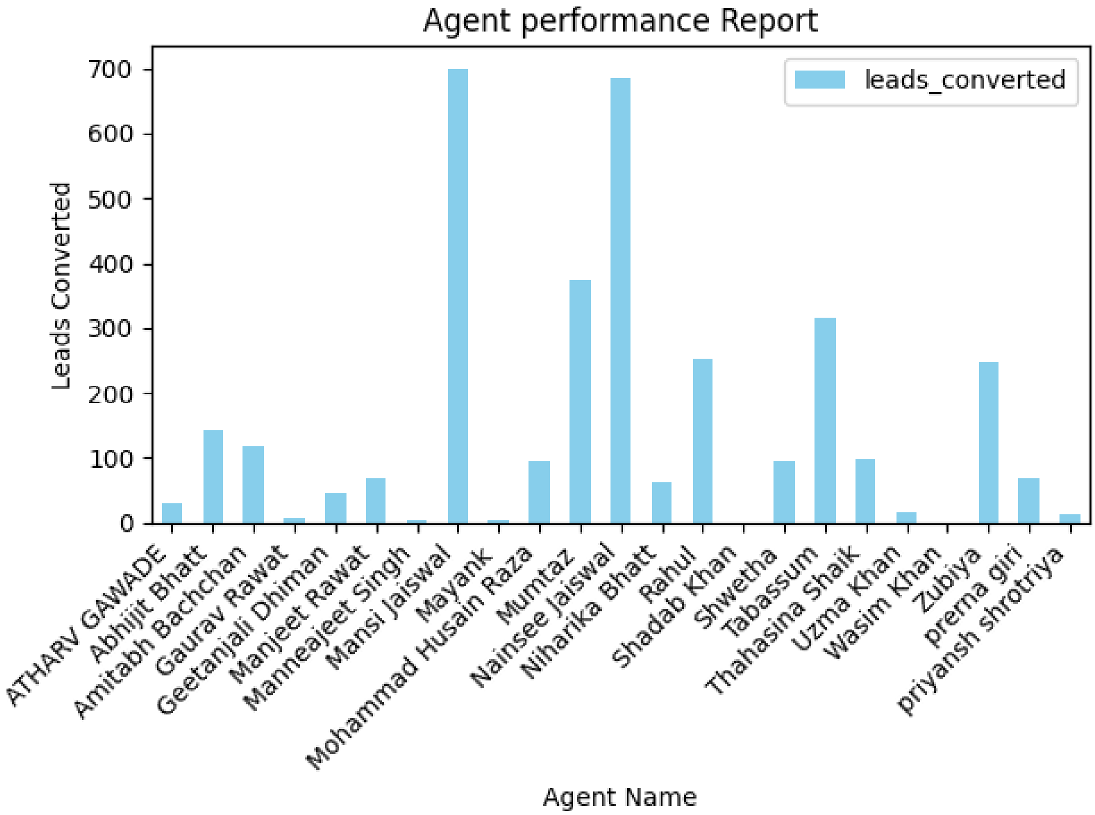

Boxplot of Average Agent Call Duration
no_of_calls
4000
3500
3000
2500
2000
1500
1000
500
0
ATHARV GAWADE
Abhijit Bhatt
Amitabh Bachchan
Gaurav Rawat
Geetanjali Dhiman
Manjeet Rawat
Manneajeet Singh
Mansi Jaiswal
Mayank
Mohammad Hus
Murtaza
Nainsee Jaiswal
Niharika Bhatt
Rahul
Shadab Khan
Shwetha
Tabassum
Thahasina Shaik
Uzma Khan
Wasim Khan
Zubiya
prerna giri
priyansh shrotriya
Agent Name

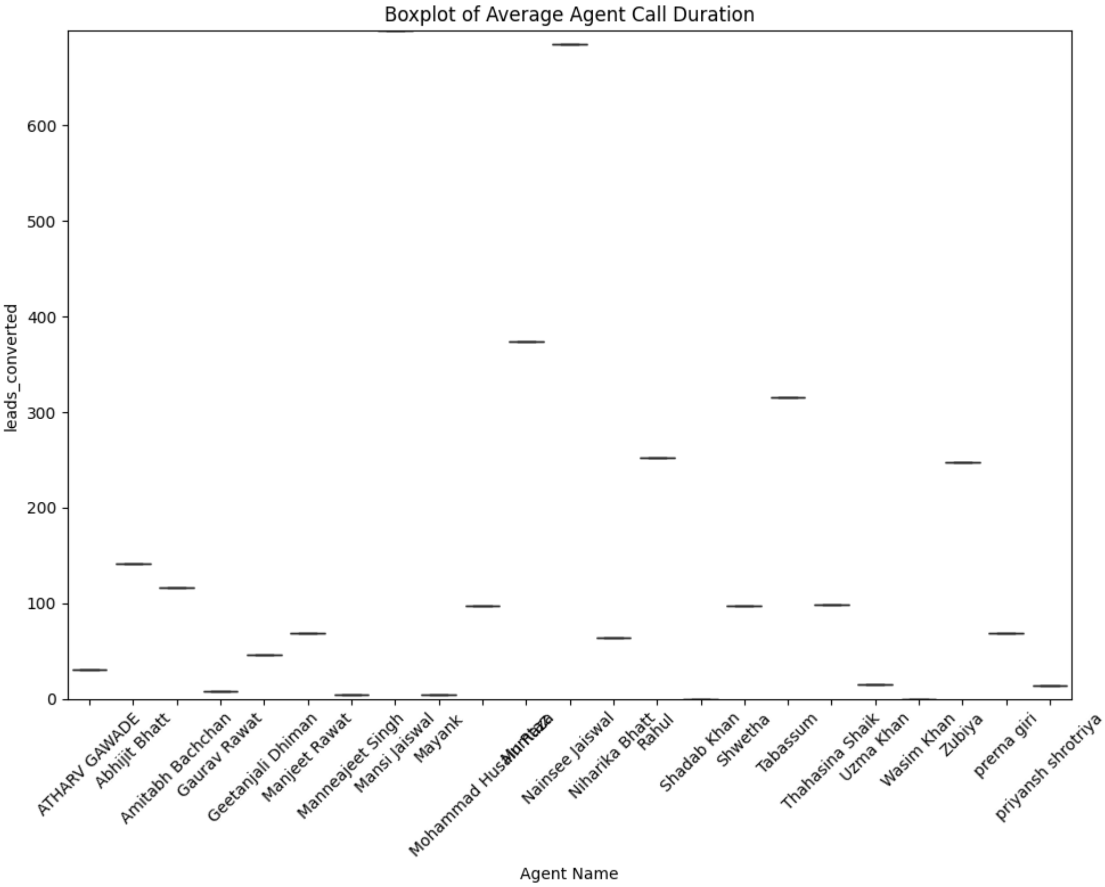
```
<Figure size 1600x1200 with 0 Axes>
```


Agent performance Report
calls_connected
Calls Connected
0
200
400
600
800
1000
1200
1400
1600
ATHARV GAWADE
Abhijit Bhatt
Amitabh Bachchan
Gaurav Rawat
Geetanjali Dhiman
Manjeet Rawat
Manneajeet Singh
Mansi Jaiswal
Mayank
Mohammad Husain Raza
Mumtaz
Nainsee Jaiswal
Niharika Bhatt
Rahul
Shadab Khan
Shwetha
Tabassum
Thahasina Shaik
Uzma Khan
Wasim Khan
Zubiya
prerna giri
priyansh shrotriya
Agent Name

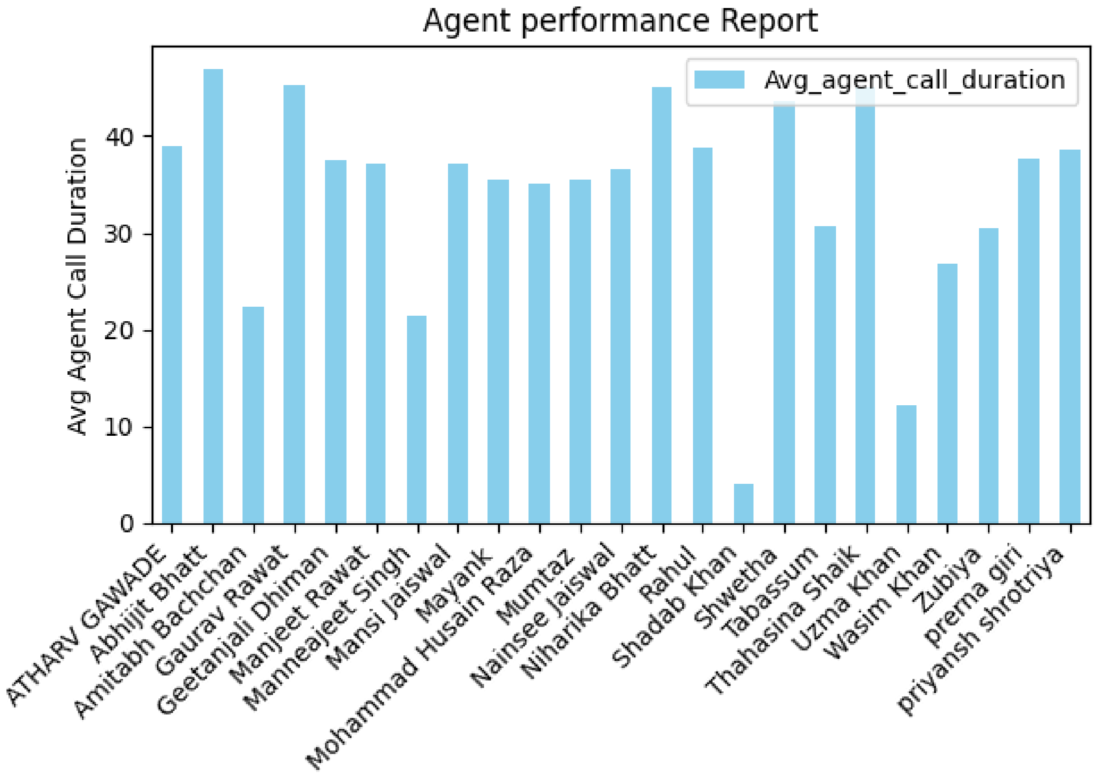

Boxplot of Average Agent Call Duration
calls_connected
0
200
400
600
800
1000
1200
1400
ATHARV GAWADE
Abhijit Bhatt
Amitabh Bachchan
Gaurav Rawat
Geetanjali Dhiman
Manjeet Rawat
Manneajeet Singh
Mansi Jaiswal
Mayank
Mohammad Hussain Raza
Murtaza
Nainsee Jaiswal
Niharika Bhatt
Rahul
Shadab Khan
Shwetha
Tabassum
Thahasina Shaik
Uzma Khan
Wasim Khan
Zubiya
prerna giri
priyansh shrotriya
Agent Name

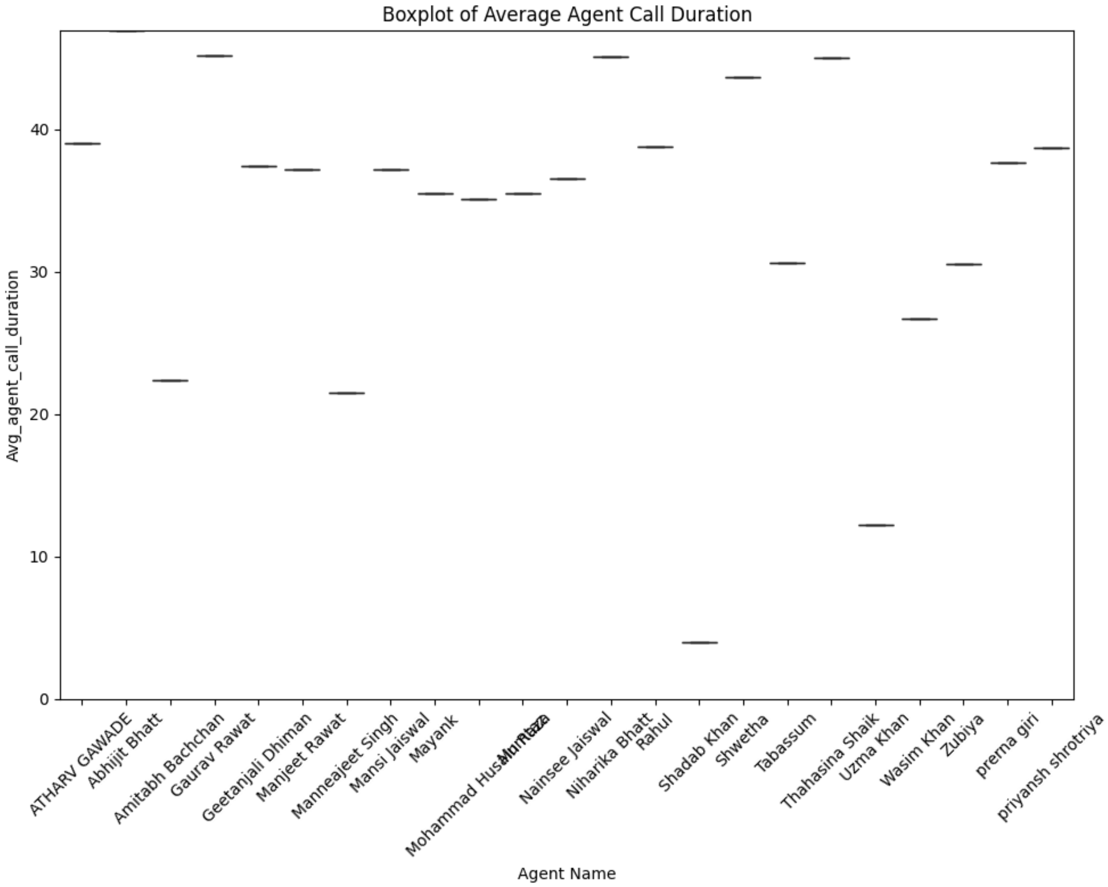
```
<Figure size 1600x1200 with 0 Axes>
```


Agent performance Report
leads_converted
Leads Converted
0
100
200
300
400
500
600
700
ATHARV GAWADE
Abhijit Bhatt
Amitabh Bachchan
Gaurav Rawat
Geetanjali Dhiman
Manjeet Rawat
Manneajeet Singh
Mansi Jaiswal
Mayank
Mohammad Husain Raza
Mumtaz
Nainsee Jaiswal
Niharika Bhatt
Rahul
Shadab Khan
Shwetha
Tabassum
Thahasina Shaik
Uzma Khan
Wasim Khan
Zubiya
prerna giri
priyansh shrotriya
Agent Name

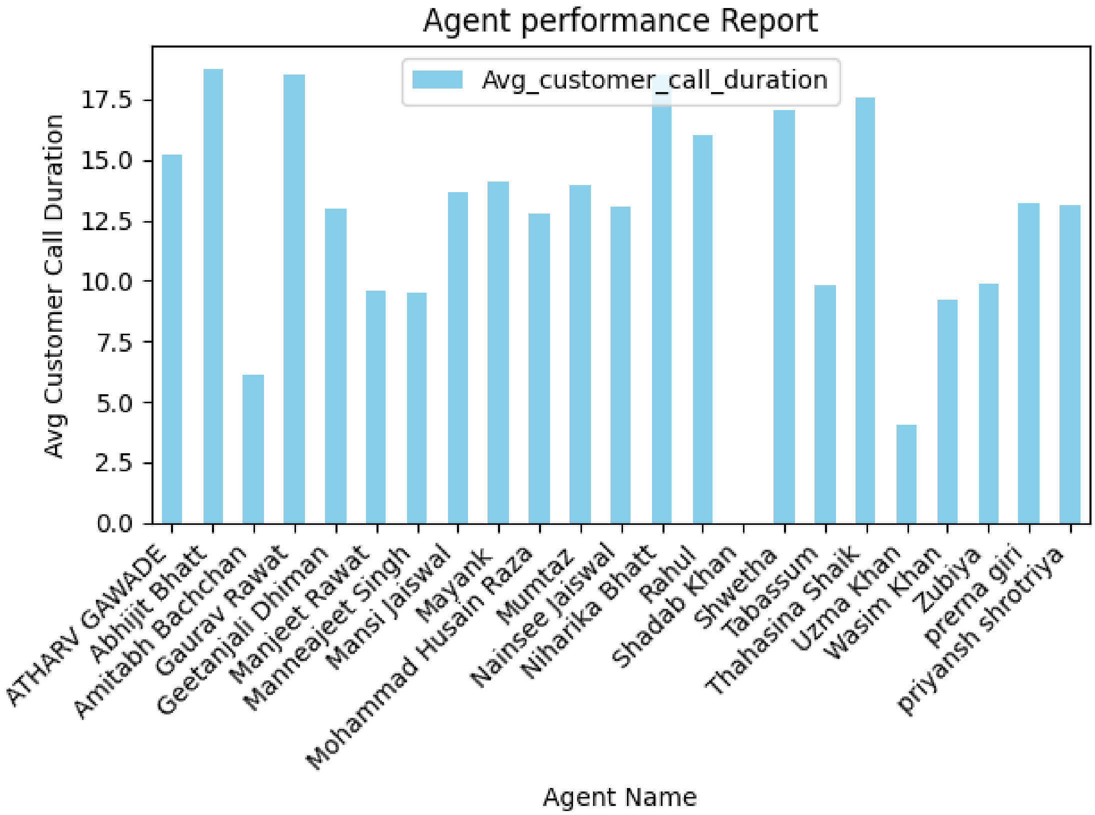

Boxplot of Average Agent Call Duration
leads_converted
0
100
200
300
400
500
600
ATHARV GAWADE
Abhijit Bhatt
Amitabh Bachchan
Gaurav Rawat
Geetanjali Dhiman
Manjeet Rawat
Manneajeet Singh
Mansi Jaiswal
Mayank
Mohammad Hus
Murtaza
Nainsee Jaiswal
Niharika Bhatt
Rahul
Shadab Khan
Shwetha
Tabassum
Thahasina Shaik
Uzma Khan
Wasim Khan
Zubiya
prerna giri
priyansh shrotriya
Agent Name

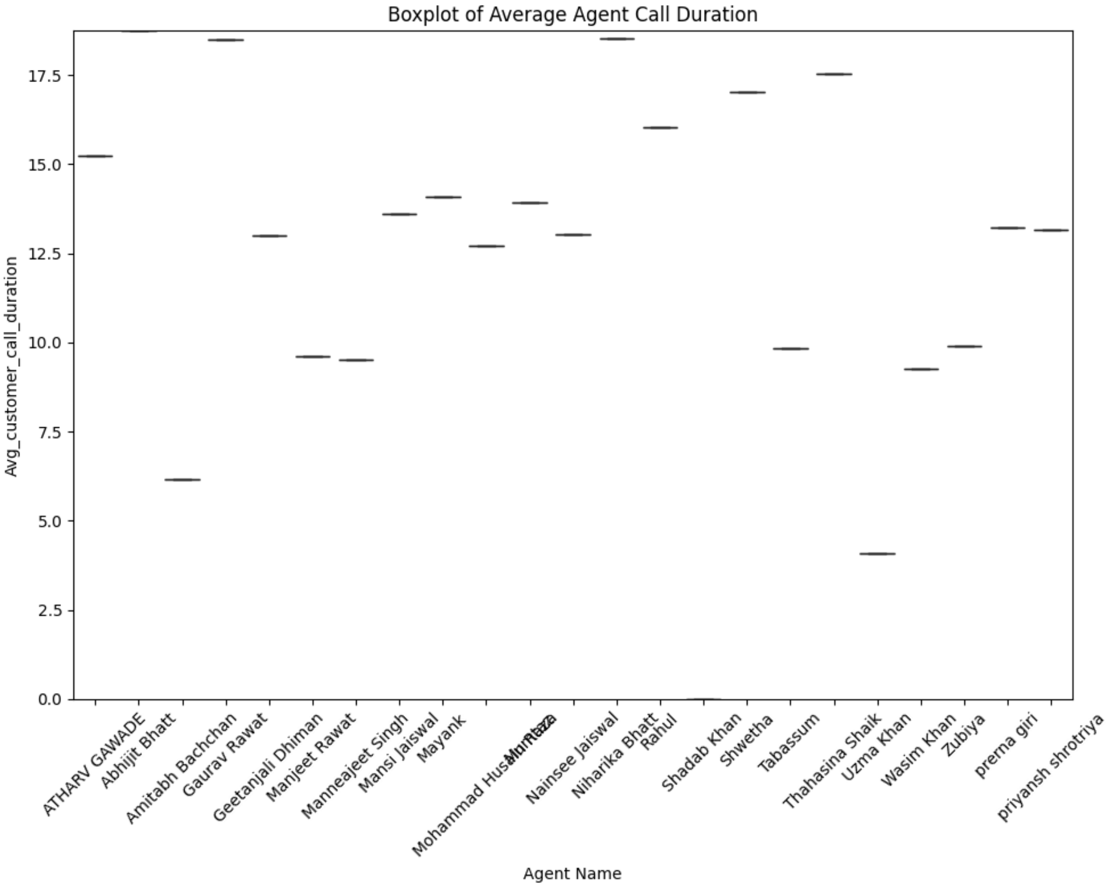
```
<Figure size 1600x1200 with 0 Axes>
```


Agent performance Report
Avg_agent_call_duration
Avg Agent Call Duration
0
10
20
30
40
Agent Name
ATHARV GAWADE
Abhijit Bhatt
Amitabh Bachchan
Gaurav Rawat
Geetanjali Dhiman
Manjeet Rawat
Manneajeet Singh
Mansi Jaiswal
Mayank
Mohammad Husain Raza
Mumtaz
Nainsee Jaiswal
Niharika Bhatt
Rahul
Shadab Khan
Shwetha
Tabassum
Thahasina Shaik
Uzma Khan
Wasim Khan
Zubiya
prerna giri
priyansh shrotriya


Boxplot of Average Agent Call Duration
Avg_agent_call_duration
0
10
20
30
40
ATHARV GAWADE
Abhijit Bhatt
Amitabh Bachchan
Gaurav Rawat
Geetanjali Dhiman
Manjeet Rawat
Manneajeet Singh
Mansi Jaiswal
Mayank
Mohammad Husain
Murtaza
Nainsee Jaiswal
Niharika Bhatt
Rahul
Shadab Khan
Shwetha
Tabassum
Thahasina Shaik
Uzma Khan
Wasim Khan
Zubiya
prerna giri
priyansh shrotriya
Agent Name

```
<Figure size 1600x1200 with 0 Axes>
```


Agent performance Report
Avg_customer_call_duration
Avg Customer Call Duration
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
ATHARV GAWADE
Abhijit Bhatt
Amitabh Bachchan
Gaurav Rawat
Geetanjali Dhiman
Manjeet Rawat
Manneajeet Singh
Mansi Jaiswal
Mayank
Mohammad Husain Raza
Mumtaz
Nainsee Jaiswal
Niharika Bhatt
Rahul
Shadab Khan
Shwetha
Tabassum
Thahasina Shaik
Uzma Khan
Wasim Khan
Zubiya
prerna giri
priyansh shrotriya
Agent Name



```
              Agent Name  no_of_calls  calls_connected  leads_converted  \
0          ATHARV GAWADE          386              132               31
1          Abhijit Bhatt         1147              434              142
2       Amitabh Bachchan          999              201              117
3           Gaurav Rawat           44               13                8
4      Geetanjali Dhiman          533              130               46
5          Manjeet Rawat          668              224               69
6       Manneajeet Singh           27               11                4
7          Mansi Jaiswal         4134             1553              699
8                 Mayank           57               20                5
9   Mohammad Husain Raza          750              247               97
10                Mumtaz         2453              916              374
11       Nainsee Jaiswal         4372             1491              685
12        Niharika Bhatt          582              232               64
13                 Rahul         1304              470              253
14           Shadab Khan            1                0                0
15               Shwetha          704              259               97
16              Tabassum         2930              998              315
17        Thahasina Shaik          659              238               99
```

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18             Uzma Khan          104               15               15
19            Wasim Khan            4                2                0
20                Zubiya         2128              629              248
21           prerna giri          572              215               69
22    priyansh shrotriya           65               24               14

    Avg_agent_call_duration  Avg_customer_call_duration
0                 39.007772                   15.225389
1                 46.931997                   18.741064
2                 22.380380                    6.146146
3                 45.181818                   18.500000
4                 37.469043                   12.996248
5                 37.188623                    9.598802
6                 21.481481                    9.518519
7                 37.163280                   13.615627
8                 35.508772                   14.087719
9                 35.133333                   12.726667
10                35.485120                   13.937220
11                36.529735                   13.043687
12                45.135739                   18.530928
13                38.801380                   16.029141
14                 4.000000                    0.000000
15                43.643466                   17.015625
16                30.637201                    9.832765
17                45.048558                   17.546282
18                12.230769                    4.076923
19                26.750000                    9.250000
20                30.555451                    9.906485
21                37.694056                   13.220280
22                38.676923                   13.153846
```

[ ]:

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Explaination:
Metrics:
Number of Calls (no_of_calls):

This metric indicates the total number of calls made by each agent.
It reflects the agent's activity level and effort in making calls.

Calls Connected (calls_connected):

Represents the number of calls that were successfully connected, i.e., calls␣
 ↪with a status of "completed".
It measures the agent's effectiveness in reaching and connecting with the other␣
 ↪party.

Leads Converted (leads_converted):
```

```
Shows the number of calls where the lead status changed to "Interested".
It signifies the agent's success in converting calls into potential leads or prospects.

Average Agent Call Duration (Avg_agent_call_duration):

This metric calculates the average duration of calls handled by each agent.
It provides insights into the agent's efficiency in handling calls and engaging with leads or customers.

Average Customer Call Duration (Avg_customer_call_duration):

Represents the average duration of customer-side calls.
It gives an indication of the duration of interactions from the customer's perspective.
```

[ ]:

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Additional Recommendations:

CAMPAIGN PERFROMANCE REPORT:
1. Implement strategies to reduce lost calls due to no answer, such as better timing, increased follow-ups, or automated callback options.
2. Understand what makes these campaigns successful and replicate these strategies in other campaigns.
3. Investigate the reasons behind longer agent and customer call durations to understand their impact on campaign success.
4. Optimize agent workload and resource allocation based on these insights.

LEAD DISPOSITION REPORT:
1.Allocate more resources and efforts towards these campaigns to maximize lead conversion.Analyze the successful strategies
    used in these campaigns to replicate them in other campaigns.
2.Implement better timing and follow-up strategies to increase the number of answered calls.Use analytics to determine the
    best times to contact leads.
3.While a smaller issue, consider adjusting call times or improving scheduling to contact busy leads more effectively.
4.Improve targeting to reduce the number of leads not interested in the offerings.

AGENT PERFORMANCE REPORT:
1.Analyze call duration patterns to identify the optimal length for productive conversations.
2.Implement strategies to increase the number of calls connected and minimize call durations without compromising quality.
3.Continuously monitor agent performance metrics to track progress and make adjustments as needed.
```

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4.Use data-driven insights to refine agent workflows and optimize resource allocation.
```