FicZon IT solution Client Project

January 28, 2025

[1]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import mysql.connector
import sqlalchemy as sa
import os
```

[2]:
```
connection = mysql.connector.connect(host='18.136.157.135',
                                     user='dm_team2',
                                     password='DM!$Team&27@9!20!',
                                     database='project_sales')
```

[3]:
```
data=pd.read_sql_query('show tables',connection)
print(data)
```

```
  Tables_in_project_sales
0                    data
```

[4]:
```
query="select*from data"
```

[5]:
```
data=pd.read_sql(query,connection)
```

[6]:
```
data
```

[6]:

	Created	Product_ID	Source	Mobile	\
0	14-11-2018 10:05		Website	984XXXXXXX	
1	14-11-2018 09:22		Website	XXXXXXX	
2	14-11-2018 09:21		Website	XXXXXXX	
3	14-11-2018 08:46		Website	XXXXXXX	
4	14-11-2018 07:34		Website	XXXXXXX	
…	…	…	…	…	
7417	28-04-2018 09:45	9	Call		
7418	28-04-2018 09:43	15	Call		
7419	28-04-2018 09:20	5	Live Chat-Direct		
7420	28-04-2018 08:04	21	CRM form		
7421	28-04-2018 07:54	25	Website		

```
                    EMAIL     Sales_Agent         Location Delivery_Mode  \
0     aXXXXXXX@gmail.com  Sales-Agent-11                          Mode-5
1                #VALUE!  Sales-Agent-10                          Mode-5
2     dXXXXXXX@yahoo.com  Sales-Agent-10                          Mode-5
3     wXXXXXXX@gmail.com  Sales-Agent-10                          Mode-5
4     cXXXXXXX@gmail.com  Sales-Agent-10                          Mode-5
…                    …             …                 …            …
7417  aXXXXXXX@gmail.com   Sales-Agent-6            Mumbai        Mode-4
7418             #VALUE!  Sales-Agent-12  Other Locations        Mode-5
7419  sXXXXXXX@gmail.com  Sales-Agent-11         Bangalore        Mode-1
7420  YXXXXXXX@gmail.com   Sales-Agent-4  Other Locations        Mode-1
7421  cXXXXXXX@gmail.com   Sales-Agent-3           Chennai        Mode-1

              Status
0               Open
1               Open
2               Open
3               Open
4               Open
…               …
7417            LOST
7418            LOST
7419  Not Responding
7420    Just Enquiry
7421       CONVERTED

[7422 rows x 9 columns]
```

[7]:
```
data.head()
```

[7]:
```
             Created Product_ID   Source      Mobile               EMAIL  \
0  14-11-2018 10:05             Website  984XXXXXXX  aXXXXXXX@gmail.com
1  14-11-2018 09:22             Website     XXXXXXX             #VALUE!
2  14-11-2018 09:21             Website     XXXXXXX  dXXXXXXX@yahoo.com
3  14-11-2018 08:46             Website     XXXXXXX  wXXXXXXX@gmail.com
4  14-11-2018 07:34             Website     XXXXXXX  cXXXXXXX@gmail.com

      Sales_Agent Location Delivery_Mode Status
0  Sales-Agent-11                Mode-5   Open
1  Sales-Agent-10                Mode-5   Open
2  Sales-Agent-10                Mode-5   Open
3  Sales-Agent-10                Mode-5   Open
4  Sales-Agent-10                Mode-5   Open
```

[8]:
```
data.tail()
```

[8]:
```
                Created Product_ID            Source Mobile  \
7417  28-04-2018 09:45          9              Call
7418  28-04-2018 09:43         15              Call
7419  28-04-2018 09:20          5  Live Chat-Direct
7420  28-04-2018 08:04         21          CRM form
7421  28-04-2018 07:54         25           Website

                    EMAIL     Sales_Agent         Location Delivery_Mode  \
7417  aXXXXXXX@gmail.com   Sales-Agent-6           Mumbai        Mode-4
7418            #VALUE!  Sales-Agent-12  Other Locations        Mode-5
7419  sXXXXXXX@gmail.com  Sales-Agent-11        Bangalore        Mode-1
7420  YXXXXXXX@gmail.com   Sales-Agent-4  Other Locations        Mode-1
7421  cXXXXXXX@gmail.com   Sales-Agent-3          Chennai        Mode-1

              Status
7417            LOST
7418            LOST
7419  Not Responding
7420    Just Enquiry
7421       CONVERTED
```

[9]:
```
data.dtypes
```

[9]:
```
Created          object
Product_ID       object
Source           object
Mobile           object
EMAIL            object
Sales_Agent      object
Location         object
Delivery_Mode    object
Status           object
dtype: object
```

[10]:
```
data.describe()
```

[10]:
```
                 Created Product_ID Source Mobile    EMAIL    Sales_Agent  \
count               7422       7422   7422   7422     7422           7422
unique              6752         30     26    487      883             13
top     26-09-2018 11:30         18   Call         #VALUE!  Sales-Agent-4
freq                   4       1711   2547   1810     1701           1500

                Location Delivery_Mode     Status
count               7422          7422       7422
unique                18             5         11
top     Other Locations        Mode-5  Junk Lead
freq                2500          2975       1536
```

[11]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7422 entries, 0 to 7421
Data columns (total 9 columns):
 #   Column         Non-Null Count  Dtype 
---  ------         --------------  ----- 
 0   Created        7422 non-null   object
 1   Product_ID     7422 non-null   object
 2   Source         7422 non-null   object
 3   Mobile         7422 non-null   object
 4   EMAIL          7422 non-null   object
 5   Sales_Agent    7422 non-null   object
 6   Location       7422 non-null   object
 7   Delivery_Mode  7422 non-null   object
 8   Status         7422 non-null   object
dtypes: object(9)
memory usage: 522.0+ KB
```

[12]:
```
data.isnull().sum()
```

[12]:
```
Created          0
Product_ID       0
Source           0
Mobile           0
EMAIL            0
Sales_Agent      0
Location         0
Delivery_Mode    0
Status           0
dtype: int64
```

[13]:
```
data.shape
```

[13]:
```
(7422, 9)
```

[14]:
```
data.drop(['Mobile'],axis =1,inplace = True)
data.drop(['EMAIL'],axis =1,inplace = True)
data.drop(['Created'],axis =1,inplace = True)
```

[15]:
```
data.replace('',np.nan,inplace=True)
data.dropna(inplace=True)
data.reset_index(inplace=True,drop=True)
data.shape
```

[15]:
```
(7328, 6)
```

[16]:
```
replacements = {
    'Live Chat': ['Live Chat-Direct', 'Live Chat-Google Organic', 'Live Chat␣
 ↪-PPC', 'Live Chat-Blog',
                  'Live Chat-Quora', 'Live Chat-CPC', 'Live Chat-Google Ads',
                  'Live Chat-Adwords Remarketing', 'Live Chat-Youtube', 'Live␣
 ↪Chat-Justdial'],
    'Existing Customer': ['Existing Client', 'CRM form', 'Personal Contact'],
    'Customer Referral': 'By Recommendation',
    'Website': ['US Website', 'Just Dial'],
    'Campaign': ['E-mail Campaign', 'SMS Campaign', 'E-Mail Message', 'Other']
}

for new_value, old_values in replacements.items():
    data['Source'] = data['Source'].replace(to_replace=old_values,␣
 ↪value=new_value)
```

[17]:
```
data.Location.
 ↪replace(['UAE','USA','UK','AUSTRALIA','Singapore','Malaysia','EUROPE'],'Foreign',inplace=Tr
data.Location.replace(['Howrah','Kolkata','Trivandrum'],'Other␣
 ↪Locations',inplace=True)
```

[18]:
```
data.Product_ID.
 ↪replace(['8','6','3','17','22','11','7','28','0','23','24','16','13','4','14','26','12','2'
                        'Less Sold Product',inplace=True)
```

[19]:
```
#Defie the  'Status' as 'Good' or 'Bad'
data.Status.replace(['CONVERTED','converted','In Progress␣
 ↪Positive','Potential','Long Term','Open'],'Good',inplace=True)
data.Status.replace(['LOST','In Progress Negative','Not Responding','Junk␣
 ↪Lead','Just Enquiry'],'Bad',inplace=True)
```

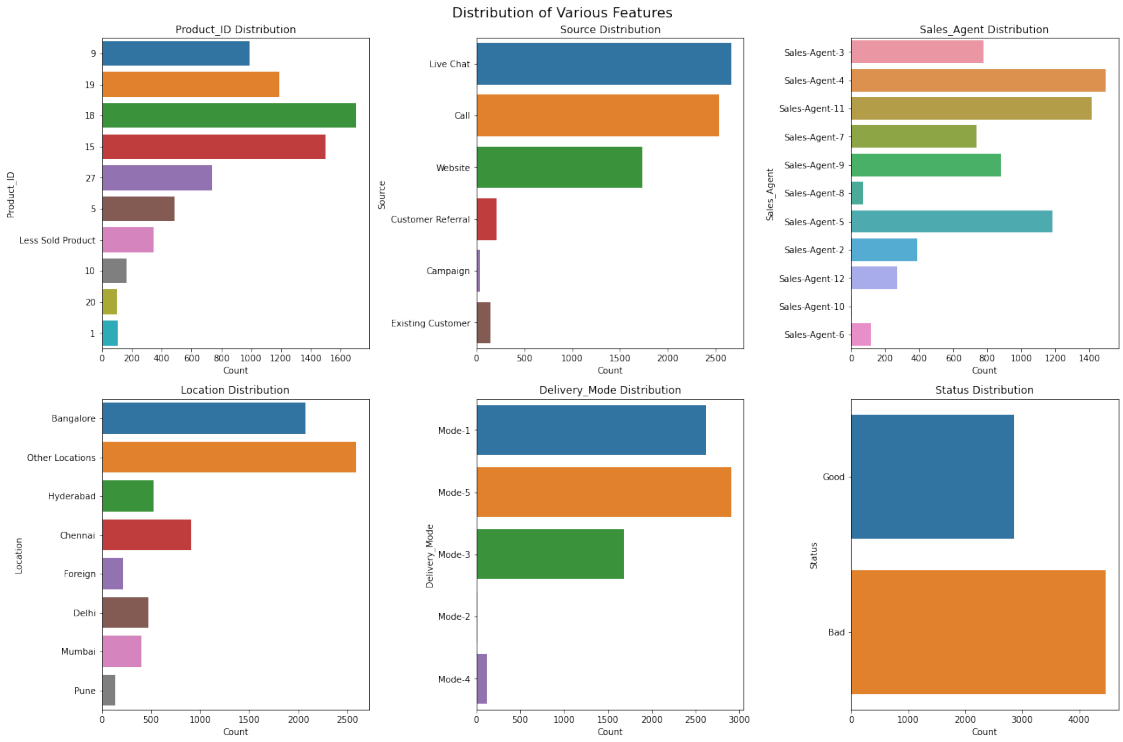
[20]:
```
data.head()
```

[20]:

	Product_ID	Source	Sales_Agent	Location	Delivery_Mode	Status
0	9	Live Chat	Sales-Agent-3	Bangalore	Mode-1	Good
1	19	Call	Sales-Agent-4	Other Locations	Mode-5	Good
2	18	Website	Sales-Agent-11	Other Locations	Mode-1	Good
3	15	Website	Sales-Agent-7	Hyderabad	Mode-1	Bad
4	18	Call	Sales-Agent-7	Bangalore	Mode-1	Good

[21]:
```
fig, axes = plt.subplots(2, 3, figsize=(18, 12))
fig.suptitle('Distribution of Various Features', fontsize=16)

columns_to_plot = ['Product_ID', 'Source', 'Sales_Agent', 'Location',␣
 ↪'Delivery_Mode', 'Status']

for i, col in enumerate(columns_to_plot):
```

```
    row = i // 3
    col_pos = i % 3

    sns.countplot(data=data, y=col, ax=axes[row, col_pos])
    axes[row, col_pos].set_title(f'{col} Distribution')
    axes[row, col_pos].set_xlabel('Count')

plt.tight_layout()
plt.show()
```



[22]:
```
from sklearn.preprocessing import LabelEncoder

label_encoder = LabelEncoder()
columns_to_encode = [0, 1, 2, 3, 4, 5]

for col in columns_to_encode:
    data.iloc[:, col] = label_encoder.fit_transform(data.iloc[:, col])

data.head()
```

[22]:

	Product_ID	Source	Sales_Agent	Location	Delivery_Mode	Status
0	8	4	4	0	0	1
1	4	0	5	6	4	1

```
2          3       5           1         6              0       1
3          2       5           8         4              0       0
4          3       0           8         0              0       1
```

[23]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7328 entries, 0 to 7327
Data columns (total 6 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Product_ID     7328 non-null   int32
 1   Source         7328 non-null   int32
 2   Sales_Agent    7328 non-null   int32
 3   Location       7328 non-null   int32
 4   Delivery_Mode  7328 non-null   int32
 5   Status         7328 non-null   int32
dtypes: int32(6)
memory usage: 171.9 KB
```

[24]:
```
data.corr()
```

[24]:
```
               Product_ID    Source  Sales_Agent  Location  Delivery_Mode  \
Product_ID       1.000000  0.074868     0.056065 -0.226961      -0.181464
Source           0.074868  1.000000    -0.023186 -0.003034      -0.216516
Sales_Agent      0.056065 -0.023186     1.000000 -0.140876      -0.224688
Location        -0.226961 -0.003034    -0.140876  1.000000       0.414193
Delivery_Mode   -0.181464 -0.216516    -0.224688  0.414193       1.000000
Status           0.138943 -0.015411     0.137074 -0.347418      -0.220445

                 Status
Product_ID     0.138943
Source        -0.015411
Sales_Agent    0.137074
Location      -0.347418
Delivery_Mode -0.220445
Status         1.000000
```

[25]:
```
y = data.Status
X = data.iloc[:,[0,1,2,3,4]]
```

[28]:
```
from sklearn.model_selection import train_test_split

# Splitting into training and testing data for accuracy
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3,␣
 ↪random_state=10)
```

[29]:
```
# Splitting into training and testing data for accuracy
X_train, X_test, y_train, y_test = train_test_split(X,y,test_size=0.
↪3,random_state=10)
```

[30]:
```
X_train.shape
```

[30]:
```
(5129, 5)
```

[31]:
```
X_test.shape
```

[31]:
```
(2199, 5)
```

[35]:
```
from imblearn.over_sampling import SMOTE

# SMOTE for sampling technique
smote = SMOTE()
X_train, y_train = smote.fit_resample(X_train, y_train)
```

[36]:
```
X_train.shape
```

[36]:
```
(6294, 5)
```

[37]:
```
X_test.shape
```

[37]:
```
(2199, 5)
```

[ ]: