



```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score, precision_score, recall_score, confusion_matrix, classification_report
from sklearn.ensemble import RandomForestClassifier
from xgboost import XGBClassifier
from sklearn.preprocessing import StandardScaler
```

! pip install xGboost

Requirement already satisfied: xGboost in /usr/local/lib/python3.12/dist-packages (3.1.1)  
Requirement already satisfied: numpy in /usr/local/lib/python3.12/dist-packages (from xGboost) (2.0.2)  
Requirement already satisfied: nvidia-nccl-cu12 in /usr/local/lib/python3.12/dist-packages (from xGboost) (2.27.3)  
Requirement already satisfied: scipy in /usr/local/lib/python3.12/dist-packages (from xGboost) (1.16.3)

food=pd.read\_csv('/content/Foodpanda Analysis Dataset.csv')

display(food)

|      | customer_id | gender | age      | city      | signup_date | order_id | order_date | restaurant_name | dish_name | category  | quantity | price   | payment_method | order_frequency | last_order_date |
|------|-------------|--------|----------|-----------|-------------|----------|------------|-----------------|-----------|-----------|----------|---------|----------------|-----------------|-----------------|
| 0    | C5663       | Male   | Adult    | Peshawar  | 1/14/2024   | O9663    | 8/23/2023  | McDonald's      | Burger    | Italian   | 5        | 1478.27 | Cash           | 38              | 7/19/2023       |
| 1    | C2831       | Male   | Adult    | Multan    | 7/7/2024    | O6831    | 8/23/2023  | KFC             | Burger    | Italian   | 3        | 956.04  | Wallet         | 24              | 11/25/2023      |
| 2    | C2851       | Other  | Senior   | Multan    | 6/20/2025   | O6851    | 8/23/2023  | Pizza Hut       | Fries     | Italian   | 2        | 882.51  | Cash           | 42              | 5/10/2023       |
| 3    | C1694       | Female | Senior   | Peshawar  | 9/5/2023    | O5694    | 8/23/2023  | Subway          | Pizza     | Dessert   | 4        | 231.30  | Card           | 27              | 7/24/2023       |
| 4    | C4339       | Other  | Senior   | Lahore    | 12/29/2023  | O8339    | 8/24/2023  | KFC             | Sandwich  | Dessert   | 1        | 1156.69 | Cash           | 35              | 12/21/2023      |
| ...  | ...         | ...    | ...      | ...       | ...         | ...      | ...        | ...             | ...       | ...       | ...      | ...     | ...            | ...             | ...             |
| 5995 | C6849       | Male   | Adult    | Multan    | 11/25/2024  | O10849   | 8/22/2025  | Pizza Hut       | Burger    | Italian   | 4        | 875.71  | Cash           | 28              | 11/29/2023      |
| 5996 | C3787       | Female | Adult    | Islamabad | 1/28/2025   | O7787    | 8/22/2025  | KFC             | Pizza     | Italian   | 5        | 1118.26 | Cash           | 12              | 6/8/2023        |
| 5997 | C2841       | Other  | Teenager | Islamabad | 10/19/2023  | O6841    | 8/22/2025  | KFC             | Sandwich  | Italian   | 4        | 1005.83 | Card           | 31              | 12/30/2023      |
| 5998 | C1624       | Male   | Adult    | Islamabad | 6/17/2024   | O5624    | 8/22/2025  | KFC             | Fries     | Fast Food | 4        | 1226.10 | Card           | 37              | 12/27/2023      |
| 5999 | C2068       | Female | Adult    | Multan    | 3/15/2025   | O6068    | 8/22/2025  | Burger King     | Fries     | Fast Food | 3        | 1131.27 | Card           | 2               | 6/13/2023       |

6000 rows × 16 columns

Next steps:

[Generate code with food](#)

[New interactive sheet](#)

```
food.info()
food.fillna('NaN',inplace=True)
food.columns
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6000 entries, 0 to 5999
Data columns (total 16 columns):
#   Column                Non-Null Count  Dtype  
---  -
0   customer_id           6000 non-null   object 
1   gender                6000 non-null   object 
2   age                  6000 non-null   object 
3   city                 6000 non-null   object 
4   signup_date          6000 non-null   object 
5   order_id              6000 non-null   object 
6   order_date           6000 non-null   object 
7   restaurant_name      6000 non-null   object 
8   dish_name            6000 non-null   object 
9   category              6000 non-null   object 
10  quantity              6000 non-null   int64  
11  price                 6000 non-null   float64 
12  payment_method        6000 non-null   object 
13  order_frequency       6000 non-null   int64  
14  last_order_date       6000 non-null   object 
15  loyalty_points        6000 non-null   int64  
16  churned               6000 non-null   object 
17  rating                4032 non-null   float64 
18  rating_date           6000 non-null   object 
19  delivery_status       6000 non-null   object 
dtypes: float64(2), int64(3), object(15)
memory usage: 937.6+ KB
/tmp/ipython-input-3008993390.py:2: FutureWarning: Setting an item of incompatible dtype is deprecated and will raise an error in a future version of pandas. Value 'NaN' has dtype incompatible with object
  food.fillna('NaN',inplace=True)
Index(['customer_id', 'gender', 'age', 'city', 'signup_date', 'order_id',
      'order_date', 'restaurant_name', 'dish_name', 'category', 'quantity',
      'price', 'payment_method', 'order_frequency', 'last_order_date',
      'loyalty_points', 'churned', 'rating', 'rating_date',
      'delivery_status'],
      dtype='object')
```

```
specific=food.groupby(['restaurant_name','category','churned','payment_method',]).get_group(('KFC','Italian','Active','Cash'))
disactive=food.groupby(['restaurant_name','category','churned','payment_method',]).get_group(('KFC','Italian','Inactive','Cash'))
not_cash=food.groupby(['restaurant_name','churned','payment_method',]).get_group(('KFC','Active','Wallet'))
display(specific)
```

|      | customer_id | gender | age      | city      | signup_date | order_id | order_date | restaurant_name | dish_name | category | quantity | price   | payment_method | order_frequency | last_order_date |
|------|-------------|--------|----------|-----------|-------------|----------|------------|-----------------|-----------|----------|----------|---------|----------------|-----------------|-----------------|
| 62   | C3011       | Male   | Teenager | Islamabad | 7/19/2025   | O7011    | 8/30/2023  | KFC             | Pizza     | Italian  | 4        | 343.94  | Cash           | 20              | 1/27/2023       |
| 245  | C1743       | Female | Teenager | Karachi   | 9/15/2023   | O5743    | 9/19/2023  | KFC             | Fries     | Italian  | 3        | 1223.56 | Cash           | 32              | 1/27/2023       |
| 459  | C1901       | Female | Teenager | Multan    | 7/22/2024   | O5901    | 10/16/2023 | KFC             | Sandwich  | Italian  | 5        | 328.98  | Cash           | 31              | 8/18/2023       |
| 488  | C3999       | Male   | Teenager | Karachi   | 3/4/2024    | O7999    | 10/19/2023 | KFC             | Pasta     | Italian  | 1        | 503.13  | Cash           | 15              | 9/19/2023       |
| 763  | C2416       | Other  | Senior   | Lahore    | 6/10/2024   | O6416    | 11/19/2023 | KFC             | Burger    | Italian  | 4        | 1391.02 | Cash           | 49              | 4/20/2023       |
| 1273 | C3114       | Other  | Teenager | Lahore    | 5/7/2024    | O7114    | 1/21/2024  | KFC             | Pasta     | Italian  | 3        | 1399.39 | Cash           | 14              | 12/22/2023      |
| 1543 | C4349       | Other  | Adult    | Multan    | 8/7/2024    | O8349    | 2/25/2024  | KFC             | Pizza     | Italian  | 2        | 908.07  | Cash           | 13              | 10/23/2023      |
| 1554 | C2968       | Male   | Senior   | Karachi   | 10/4/2024   | O6968    | 2/26/2024  | KFC             | Pizza     | Italian  | 5        | 268.80  | Cash           | 5               | 12/13/2023      |
| 1615 | C3591       | Female | Adult    | Karachi   | 4/4/2025    | O7591    | 3/5/2024   | KFC             | Pizza     | Italian  | 3        | 879.03  | Cash           | 22              | 4/17/2023       |
| 2112 | C4510       | Female | Senior   | Lahore    | 1/3/2025    | O8510    | 5/7/2024   | KFC             | Burger    | Italian  | 1        | 896.27  | Cash           | 11              | 2/11/2023       |
| 2382 | C4648       | Female | Teenager | Lahore    | 5/1/2024    | O8648    | 6/11/2024  | KFC             | Fries     | Italian  | 4        | 188.64  | Cash           | 36              | 8/28/2023       |
| 2413 | C6182       | Female | Adult    | Peshawar  | 4/17/2025   | O10182   | 6/15/2024  | KFC             | Fries     | Italian  | 1        | 646.32  | Cash           | 18              | 12/30/2023      |

|      |       |        |          |           |            |        |            |     |          |         |   |         |      |    |            |
|------|-------|--------|----------|-----------|------------|--------|------------|-----|----------|---------|---|---------|------|----|------------|
| 2509 | C1105 | Male   | Teenager | Karachi   | 10/11/2024 | O5105  | 6/26/2024  | KFC | Sandwich | Italian | 3 | 1146.47 | Cash | 18 | 1/5/2025   |
| 2700 | C3647 | Male   | Senior   | Islamabad | 4/12/2025  | O7647  | 7/19/2024  | KFC | Pizza    | Italian | 1 | 1039.54 | Cash | 4  | 4/13/2025  |
| 2879 | C6256 | Male   | Adult    | Peshawar  | 10/29/2023 | O10256 | 8/8/2024   | KFC | Burger   | Italian | 4 | 1165.45 | Cash | 32 | 8/9/2025   |
| 3003 | C2934 | Female | Senior   | Karachi   | 1/21/2025  | O6934  | 8/22/2024  | KFC | Burger   | Italian | 2 | 1069.58 | Cash | 47 | 5/28/2025  |
| 3025 | C3566 | Female | Senior   | Islamabad | 1/3/2025   | O7566  | 8/25/2024  | KFC | Burger   | Italian | 3 | 516.58  | Cash | 20 | 3/22/2025  |
| 3218 | C4502 | Other  | Senior   | Multan    | 11/18/2024 | O8502  | 9/14/2024  | KFC | Sandwich | Italian | 2 | 782.07  | Cash | 1  | 12/9/2025  |
| 3222 | C3652 | Female | Adult    | Islamabad | 1/5/2025   | O7652  | 9/14/2024  | KFC | Sandwich | Italian | 1 | 1438.90 | Cash | 1  | 6/18/2025  |
| 3523 | C5202 | Male   | Teenager | Peshawar  | 12/22/2023 | O9202  | 10/22/2024 | KFC | Sandwich | Italian | 3 | 1274.31 | Cash | 29 | 12/29/2025 |
| 3701 | C2579 | Female | Senior   | Islamabad | 7/1/2025   | O6579  | 11/13/2024 | KFC | Sandwich | Italian | 1 | 333.02  | Cash | 28 | 12/18/2025 |
| 3890 | C2634 | Other  | Teenager | Islamabad | 4/29/2024  | O6634  | 12/6/2024  | KFC | Sandwich | Italian | 3 | 1351.90 | Cash | 47 | 9/30/2025  |
| 4055 | C3939 | Female | Teenager | Multan    | 3/2/2025   | O7939  | 12/27/2024 | KFC | Fries    | Italian | 5 | 1013.38 | Cash | 12 | 10/28/2025 |
| 4060 | C2264 | Female | Teenager | Peshawar  | 3/7/2025   | O6264  | 12/28/2024 | KFC | Burger   | Italian | 4 | 1227.77 | Cash | 35 | 12/24/2025 |
| 4116 | C6366 | Female | Teenager | Lahore    | 5/11/2025  | O10366 | 1/3/2025   | KFC | Fries    | Italian | 3 | 266.28  | Cash | 45 | 12/7/2025  |
| 4223 | C4961 | Other  | Senior   | Lahore    | 9/29/2023  | O8961  | 1/16/2025  | KFC | Burger   | Italian | 3 | 1461.03 | Cash | 24 | 4/1/2025   |
| 4303 | C1834 | Other  | Senior   | Peshawar  | 6/6/2025   | O5834  | 1/27/2025  | KFC | Fries    | Italian | 5 | 1101.92 | Cash | 5  | 2/6/2025   |
| 4539 | C2633 | Male   | Adult    | Multan    | 7/23/2024  | O6633  | 2/22/2025  | KFC | Sandwich | Italian | 1 | 738.36  | Cash | 7  | 5/28/2025  |
| 4734 | C6530 | Female | Adult    | Lahore    | 7/14/2025  | O10530 | 3/18/2025  | KFC | Fries    | Italian | 3 | 990.73  | Cash | 15 | 12/4/2025  |
| 4761 | C5504 | Other  | Teenager | Multan    | 6/12/2024  | O9504  | 3/20/2025  | KFC | Fries    | Italian | 5 | 1133.47 | Cash | 30 | 1/13/2025  |
| 4801 | C5012 | Female | Senior   | Lahore    | 10/10/2023 | O9012  | 3/24/2025  | KFC | Burger   | Italian | 3 | 1470.56 | Cash | 20 | 4/11/2025  |
| 5049 | C4376 | Male   | Teenager | Islamabad | 12/26/2024 | O8376  | 4/24/2025  | KFC | Sandwich | Italian | 1 | 295.14  | Cash | 8  | 5/14/2025  |
| 5198 | C2148 | Other  | Senior   | Lahore    | 12/4/2023  | O6148  | 5/14/2025  | KFC | Pizza    | Italian | 4 | 1073.46 | Cash | 25 | 5/2/2025   |
| 5377 | C1470 | Male   | Teenager | Karachi   | 1/25/2025  | O5470  | 6/6/2025   | KFC | Sandwich | Italian | 4 | 388.34  | Cash | 14 | 1/5/2025   |
| 5720 | C3489 | Male   | Teenager | Lahore    | 5/17/2025  | O7489  | 7/20/2025  | KFC | Pizza    | Italian | 5 | 364.08  | Cash | 31 | 2/9/2025   |

disactive.set\_index('customer\_id')

|             | gender | age      | city      | signup_date | order_id | order_date | restaurant_name | dish_name | category | quantity | price   | payment_method | order_frequency | last_order_date | loyalty |
|-------------|--------|----------|-----------|-------------|----------|------------|-----------------|-----------|----------|----------|---------|----------------|-----------------|-----------------|---------|
| customer_id |        |          |           |             |          |            |                 |           |          |          |         |                |                 |                 |         |
| C2454       | Other  | Teenager | Karachi   | 12/4/2023   | O6454    | 8/27/2023  | KFC             | Pizza     | Italian  | 1        | 249.90  | Cash           | 20              | 3/22/2025       |         |
| C2522       | Other  | Teenager | Peshawar  | 3/25/2025   | O6522    | 9/10/2023  | KFC             | Sandwich  | Italian  | 4        | 589.82  | Cash           | 28              | 12/11/2024      |         |
| C4401       | Male   | Adult    | Karachi   | 9/28/2024   | O8401    | 9/16/2023  | KFC             | Burger    | Italian  | 3        | 923.55  | Cash           | 18              | 5/15/2025       |         |
| C2341       | Female | Adult    | Multan    | 8/31/2023   | O6341    | 9/29/2023  | KFC             | Pasta     | Italian  | 2        | 828.19  | Cash           | 49              | 5/3/2025        |         |
| C3226       | Other  | Senior   | Lahore    | 3/17/2025   | O7226    | 10/18/2023 | KFC             | Pasta     | Italian  | 4        | 1350.64 | Cash           | 45              | 4/16/2025       |         |
| C3593       | Other  | Teenager | Karachi   | 7/25/2025   | O7593    | 10/30/2023 | KFC             | Sandwich  | Italian  | 4        | 802.08  | Cash           | 26              | 5/18/2025       |         |
| C2214       | Other  | Teenager | Lahore    | 5/23/2025   | O6214    | 11/15/2023 | KFC             | Sandwich  | Italian  | 2        | 287.77  | Cash           | 5               | 4/14/2025       |         |
| C3329       | Female | Teenager | Islamabad | 9/11/2024   | O7329    | 12/8/2023  | KFC             | Pizza     | Italian  | 5        | 1094.39 | Cash           | 15              | 8/28/2024       |         |
| C6117       | Male   | Teenager | Multan    | 7/2/2025    | O10117   | 12/20/2023 | KFC             | Pizza     | Italian  | 5        | 1446.48 | Cash           | 22              | 2/8/2025        |         |
| C6807       | Female | Adult    | Islamabad | 5/17/2024   | O10807   | 12/29/2023 | KFC             | Burger    | Italian  | 4        | 863.09  | Cash           | 17              | 3/30/2025       |         |
| C4256       | Male   | Teenager | Lahore    | 9/27/2024   | O8256    | 2/12/2024  | KFC             | Sandwich  | Italian  | 2        | 967.79  | Cash           | 41              | 10/11/2024      |         |
| C2508       | Other  | Teenager | Karachi   | 3/5/2024    | O6508    | 2/16/2024  | KFC             | Burger    | Italian  | 2        | 178.97  | Cash           | 21              | 2/20/2025       |         |
| C3547       | Male   | Senior   | Karachi   | 10/6/2023   | O7547    | 2/24/2024  | KFC             | Burger    | Italian  | 5        | 1229.12 | Cash           | 17              | 1/26/2025       |         |
| C4075       | Female | Teenager | Multan    | 4/28/2025   | O8075    | 3/5/2024   | KFC             | Sandwich  | Italian  | 4        | 440.27  | Cash           | 48              | 3/5/2025        |         |
| C5002       | Male   | Teenager | Lahore    | 4/7/2025    | O9002    | 4/11/2024  | KFC             | Pasta     | Italian  | 2        | 757.35  | Cash           | 20              | 12/30/2024      |         |
| C3297       | Other  | Teenager | Multan    | 9/14/2024   | O7297    | 4/13/2024  | KFC             | Pizza     | Italian  | 2        | 564.24  | Cash           | 48              | 4/12/2025       |         |
| C6417       | Female | Teenager | Lahore    | 4/12/2025   | O10417   | 4/14/2024  | KFC             | Sandwich  | Italian  | 5        | 532.05  | Cash           | 19              | 1/5/2025        |         |
| C5556       | Female | Adult    | Lahore    | 4/8/2024    | O9556    | 4/26/2024  | KFC             | Pizza     | Italian  | 4        | 285.59  | Cash           | 45              | 12/24/2024      |         |
| C2854       | Other  | Adult    | Islamabad | 4/5/2025    | O6854    | 6/8/2024   | KFC             | Burger    | Italian  | 3        | 1391.23 | Cash           | 50              | 7/2/2025        |         |
| C5178       | Male   | Adult    | Lahore    | 1/29/2025   | O9178    | 6/13/2024  | KFC             | Burger    | Italian  | 2        | 1246.35 | Cash           | 29              | 7/21/2025       |         |
| C5387       | Male   | Senior   | Peshawar  | 3/8/2025    | O9387    | 6/15/2024  | KFC             | Burger    | Italian  | 5        | 502.34  | Cash           | 15              | 11/18/2024      |         |
| C2424       | Male   | Teenager | Karachi   | 4/14/2025   | O6424    | 6/18/2024  | KFC             | Fries     | Italian  | 2        | 1076.49 | Cash           | 18              | 5/8/2025        |         |
| C6881       | Other  | Senior   | Karachi   | 5/31/2024   | O10881   | 7/6/2024   | KFC             | Pizza     | Italian  | 5        | 874.38  | Cash           | 36              | 6/18/2025       |         |
| C3404       | Male   | Senior   | Lahore    | 12/20/2023  | O7404    | 8/30/2024  | KFC             | Pasta     | Italian  | 5        | 522.36  | Cash           | 12              | 10/4/2024       |         |
| C2001       | Female | Senior   | Lahore    | 1/31/2024   | O6001    | 10/14/2024 | KFC             | Pizza     | Italian  | 5        | 1131.71 | Cash           | 19              | 6/4/2025        |         |
| C1500       | Female | Senior   | Islamabad | 2/11/2025   | O5500    | 11/6/2024  | KFC             | Sandwich  | Italian  | 2        | 1391.72 | Cash           | 18              | 3/3/2025        |         |
| C5560       | Other  | Senior   | Multan    | 5/27/2025   | O9560    | 11/9/2024  | KFC             | Burger    | Italian  | 4        | 1046.88 | Cash           | 35              | 12/26/2024      |         |
| C6745       | Female | Teenager | Islamabad | 6/8/2025    | O10745   | 11/14/2024 | KFC             | Pizza     | Italian  | 3        | 1121.35 | Cash           | 5               | 4/4/2025        |         |
| C5440       | Other  | Senior   | Multan    | 7/24/2024   | O9440    | 11/23/2024 | KFC             | Pasta     | Italian  | 3        | 498.08  | Cash           | 49              | 10/26/2024      |         |
| C1288       | Other  | Senior   | Peshawar  | 2/18/2024   | O5288    | 12/20/2024 | KFC             | Burger    | Italian  | 4        | 541.53  | Cash           | 9               | 9/15/2024       |         |
| C1049       | Female | Senior   | Karachi   | 11/20/2023  | O5049    | 12/20/2024 | KFC             | Pasta     | Italian  | 5        | 1153.27 | Cash           | 39              | 5/14/2025       |         |
| C4558       | Other  | Adult    | Islamabad | 9/8/2023    | O8558    | 12/30/2024 | KFC             | Pasta     | Italian  | 2        | 1288.61 | Cash           | 6               | 11/26/2024      |         |
| C3364       | Female | Adult    | Lahore    | 11/18/2023  | O7364    | 1/10/2025  | KFC             | Sandwich  | Italian  | 3        | 708.98  | Cash           | 13              | 1/11/2025       |         |
| C1415       | Male   | Senior   | Peshawar  | 12/19/2024  | O5415    | 1/11/2025  | KFC             | Burger    | Italian  | 4        | 683.08  | Cash           | 30              | 4/6/2025        |         |
| C6634       | Other  | Teenager | Lahore    | 11/6/2023   | O10634   | 1/21/2025  | KFC             | Pasta     | Italian  | 2        | 1154.77 | Cash           | 21              | 4/23/2025       |         |
| C5801       | Female | Adult    | Peshawar  | 3/1/2024    | O9801    | 1/24/2025  | KFC             | Burger    | Italian  | 2        | 923.16  | Cash           | 35              | 5/3/2025        |         |
| C3587       | Other  | Adult    | Islamabad | 4/15/2025   | O7587    | 1/24/2025  | KFC             | Fries     | Italian  | 4        | 387.50  | Cash           | 33              | 2/3/2025        |         |
| C3080       | Male   | Teenager | Peshawar  | 10/30/2024  | O7080    | 2/10/2025  | KFC             | Fries     | Italian  | 2        | 322.14  | Cash           | 10              | 6/6/2025        |         |
| C6904       | Female | Senior   | Karachi   | 10/20/2023  | O10904   | 2/13/2025  | KFC             | Sandwich  | Italian  | 4        | 330.26  | Cash           | 12              | 8/12/2025       |         |
| C3601       | Female | Senior   | Lahore    | 8/27/2023   | O7601    | 3/16/2025  | KFC             | Pasta     | Italian  | 3        | 1269.04 | Cash           | 9               | 1/22/2025       |         |
| C2761       | Other  | Teenager | Islamabad | 4/14/2025   | O6761    | 3/31/2025  | KFC             | Pasta     | Italian  | 4        | 1314.37 | Cash           | 9               | 12/19/2024      |         |
| C3197       | Female | Senior   | Multan    | 11/9/2023   | O7197    | 4/1/2025   | KFC             | Burger    | Italian  | 3        | 253.60  | Cash           | 4               | 3/11/2025       |         |
| C4482       | Other  | Senior   | Karachi   | 10/20/2023  | O8482    | 4/27/2025  | KFC             | Pasta     | Italian  | 1        | 412.44  | Cash           | 19              | 12/27/2024      |         |
| C3014       | Female | Senior   | Multan    | 5/9/2024    | O7014    | 6/5/2025   | KFC             | Buruer    | Italian  | 4        | 412.80  | Cash           | 34              | 8/25/2024       |         |

|       |        |          |           |           |        |           |     |        |         |   |         |      |    |            |
|-------|--------|----------|-----------|-----------|--------|-----------|-----|--------|---------|---|---------|------|----|------------|
| C4988 | Male   | Adult    | Lahore    | 8/31/2023 | O8988  | 6/6/2025  | KFC | Pasta  | Italian | 3 | 1116.36 | Cash | 45 | 10/23/2024 |
| C2077 | Other  | Teenager | Karachi   | 8/16/2024 | O6077  | 6/12/2025 | KFC | Burger | Italian | 4 | 633.75  | Cash | 11 | 2/23/2025  |
| C3959 | Female | Senior   | Peshawar  | 4/14/2024 | O7959  | 7/1/2025  | KFC | Fries  | Italian | 3 | 679.72  | Cash | 24 | 10/7/2024  |
| C5988 | Male   | Senior   | Lahore    | 5/11/2025 | O9988  | 7/11/2025 | KFC | Burger | Italian | 5 | 986.95  | Cash | 24 | 9/30/2024  |
| C6116 | Other  | Senior   | Multan    | 10/2/2023 | O10116 | 7/26/2025 | KFC | Fries  | Italian | 3 | 333.35  | Cash | 11 | 12/29/2024 |
| C2989 | Male   | Teenager | Lahore    | 4/27/2024 | O6989  | 8/20/2025 | KFC | Pizza  | Italian | 1 | 589.25  | Cash | 15 | 1/6/2025   |
| C3787 | Female | Adult    | Islamabad | 1/28/2025 | O7787  | 8/22/2025 | KFC | Pizza  | Italian | 5 | 1118.26 | Cash | 12 | 6/8/2025   |

```
x = food.drop('churned', axis=1).replace({'Active': 1, 'Inactive': 0})
y = food['churned']
```

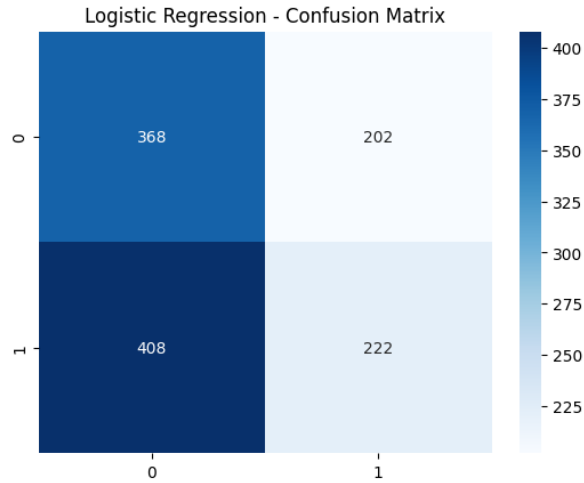
```
X_train,X_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=42)
```

```
scaler = StandardScaler()
X_train = scaler.fit_transform(X_train)
X_test = scaler.transform(X_test)
```

```
print("\n--- Logistic Regression ---")
log_model = LogisticRegression()
log_model.fit(X_train, y_train)
y_pred_log = log_model.predict(X_test)
print(classification_report(y_test, y_pred_log))
print("Accuracy:", accuracy_score(y_test, y_pred_log))
print("Precision:", precision_score(y_test, y_pred_log, pos_label=1))
print("Recall:", recall_score(y_test, y_pred_log, pos_label=1))
sns.heatmap(confusion_matrix(y_test, y_pred_log), annot=True, fmt='d', cmap='Blues')
plt.title("Logistic Regression - Confusion Matrix")
plt.show()
```

|                             |           |        |          |         |
|-----------------------------|-----------|--------|----------|---------|
| --- Logistic Regression --- |           |        |          |         |
|                             | precision | recall | f1-score | support |
| 0                           | 0.47      | 0.65   | 0.55     | 570     |
| 1                           | 0.52      | 0.35   | 0.42     | 630     |
| accuracy                    |           |        | 0.49     | 1200    |
| macro avg                   | 0.50      | 0.50   | 0.48     | 1200    |
| weighted avg                | 0.50      | 0.49   | 0.48     | 1200    |

Accuracy: 0.49166666666666664  
Precision: 0.5235849056603774  
Recall: 0.3523809523809524

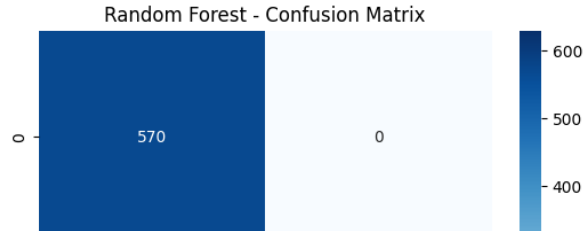


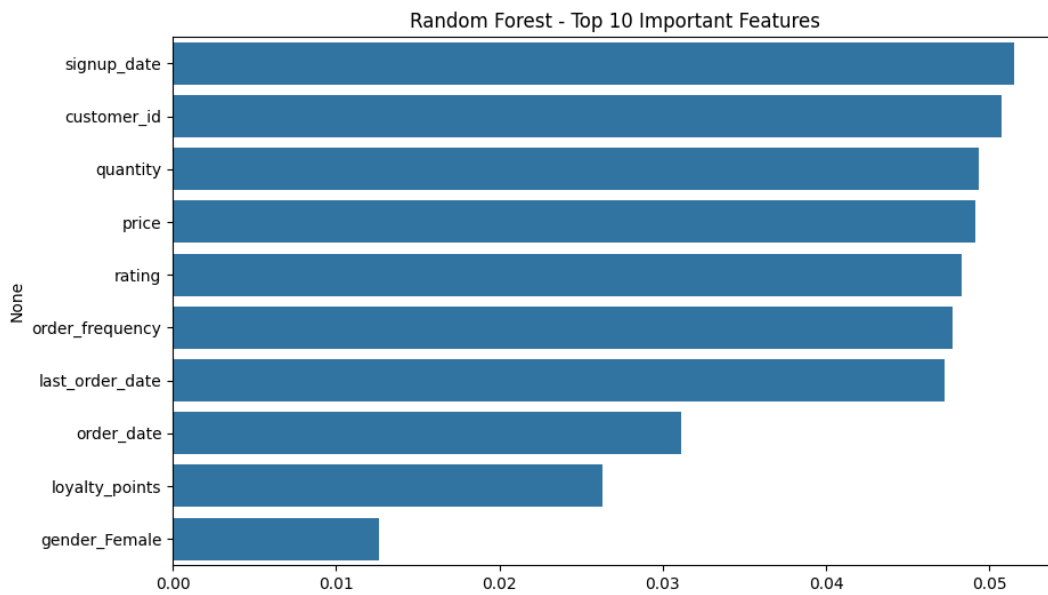
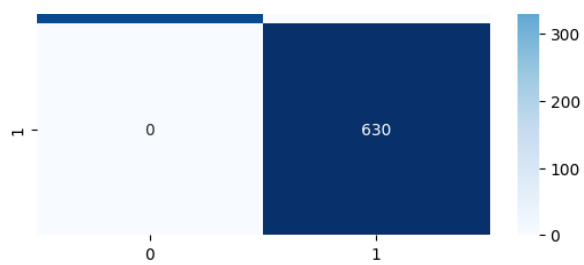
```
print("-----randomforest-----")
rf_model=RandomForestClassifier()
rf_model.fit(X_test,y_test)
y_pred=rf_model.predict(X_test)
print(classification_report(y_test,y_pred))
print("accuracy",accuracy_score(y_test,y_pred))
print("precision",precision_score(y_test,y_pred,pos_label=1))
print("recall",recall_score(y_test,y_pred,pos_label=1))
sns.heatmap(confusion_matrix(y_test,y_pred),annot=True,fmt='d',cmap='Blues')
plt.title("Random Forest - Confusion Matrix")
importances = rf_model.feature_importances_
indices = np.argsort(importances)[::-1]

plt.figure(figsize=(10,6))
sns.barplot(x=importances[indices][:10], y=x.columns[indices][:10])
plt.title("Random Forest - Top 10 Important Features")
plt.show()
```

|                        |           |        |          |         |
|------------------------|-----------|--------|----------|---------|
| -----randomforest----- |           |        |          |         |
|                        | precision | recall | f1-score | support |
| 0                      | 1.00      | 1.00   | 1.00     | 570     |
| 1                      | 1.00      | 1.00   | 1.00     | 630     |
| accuracy               |           |        | 1.00     | 1200    |
| macro avg              | 1.00      | 1.00   | 1.00     | 1200    |
| weighted avg           | 1.00      | 1.00   | 1.00     | 1200    |

accuracy 1.0  
precision 1.0  
recall 1.0





```
print("-----XGbooster classifier-----")
y_train_numeric = y_train.replace({'Active': 0, 'Inactive': 1})
y_test_numeric = y_test.replace({'Active': 0, 'Inactive': 1})

xgb_model=XGBClassifier()
xgb_model.fit(X_train,y_train_numeric)
xgb_pred=xgb_model.predict(X_test)
print(classification_report(y_test_numeric,xgb_pred))
print('accuracy',accuracy_score(y_test_numeric,xgb_pred))
print('precision',precision_score(y_test_numeric,xgb_pred,pos_label=1))
print('recall',recall_score(y_test_numeric,xgb_pred,pos_label=1))
sns.heatmap(confusion_matrix(y_test_numeric,xgb_pred),annot=True,fmt='d',cmap='Blues')
plt.title("XGBoost Classifier - Confusion Matrix")
plt.show()

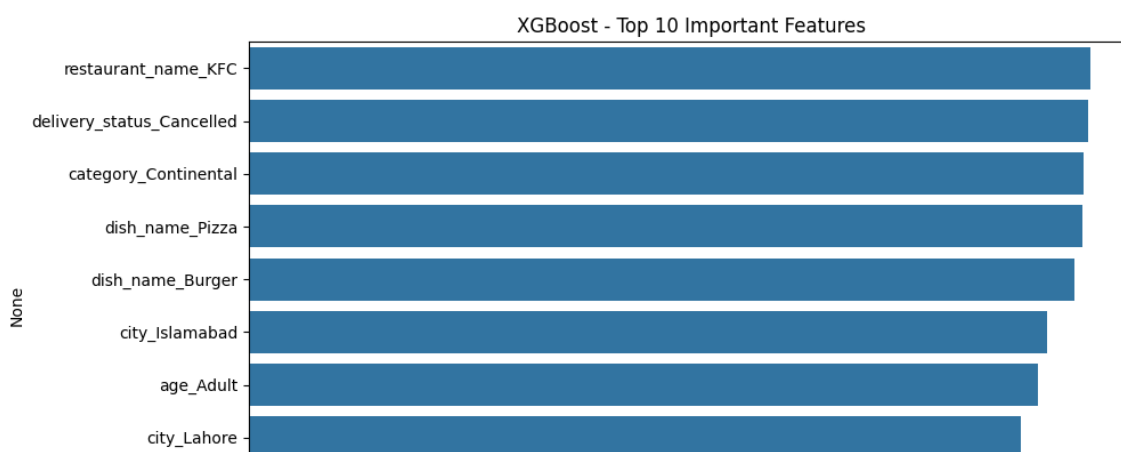
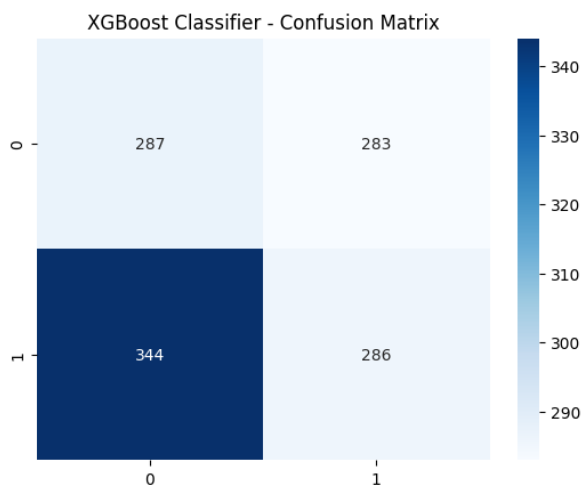
xgb_importances = xgb_model.feature_importances_
indices = np.argsort(xgb_importances)[::-1]
plt.figure(figsize=(10,6))
sns.barplot(x=xgb_importances[indices][:10], y=x.columns[indices][:10])
plt.title("XGBoost - Top 10 Important Features")
plt.show()
```

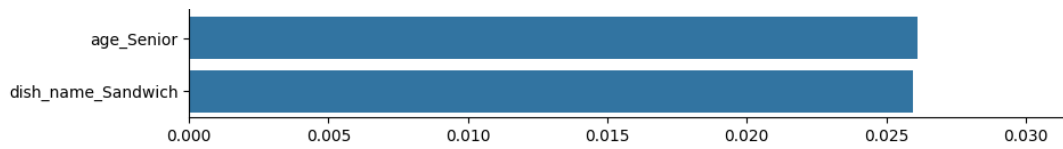
```
-----XGbooster classifier-----
              precision    recall  f1-score   support

      0               0.45       0.50      0.48         570
      1               0.50       0.45      0.48         630

 accuracy               0.48
 macro avg              0.48
weighted avg              0.48
```

```
accuracy 0.4775
precision 0.5026362038664324
recall 0.45396825396825397
```





```
log_acc = accuracy_score(y_test, y_pred_log)
rf_accuracy = accuracy_score(y_test, y_pred)
xg_accuracy = accuracy_score(y_test_numeric, xgb_pred)

log_pre = precision_score(y_test, y_pred_log, pos_label=1)
rf_pre = precision_score(y_test, y_pred, pos_label=1)
xg_precision = precision_score(y_test_numeric, xgb_pred, pos_label=1)

log_recall = recall_score(y_test, y_pred_log, pos_label=1)
rf_recall = recall_score(y_test, y_pred, pos_label=1)
xg_recall = recall_score(y_test_numeric, xgb_pred, pos_label=1)

print("--- Model Comparison ---")
print("Logistic Regression - Accuracy:", log_acc, "Precision:", log_pre, "Recall:", log_recall)
print("Random Forest - Accuracy:", rf_accuracy, "Precision:", rf_pre, "Recall:", rf_recall)
print("XGBoost - Accuracy:", xg_accuracy, "Precision:", xg_precision, "Recall:", xg_recall)

--- Model Comparison ---
Logistic Regression - Accuracy: 0.49166666666666664 Precision: 0.5235849056603774 Recall: 0.3523809523809524
Random Forest - Accuracy: 1.0 Precision: 1.0 Recall: 1.0
XGBoost - Accuracy: 0.4775 Precision: 0.5026362038664324 Recall: 0.45396825396825397
```