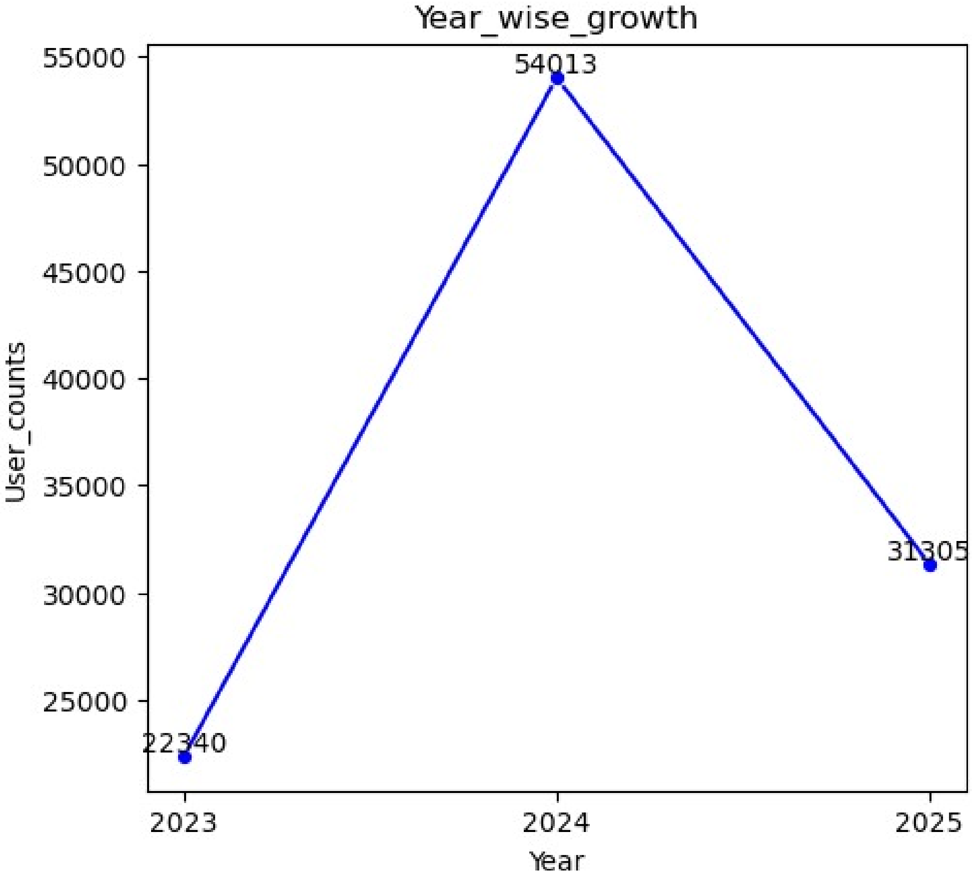
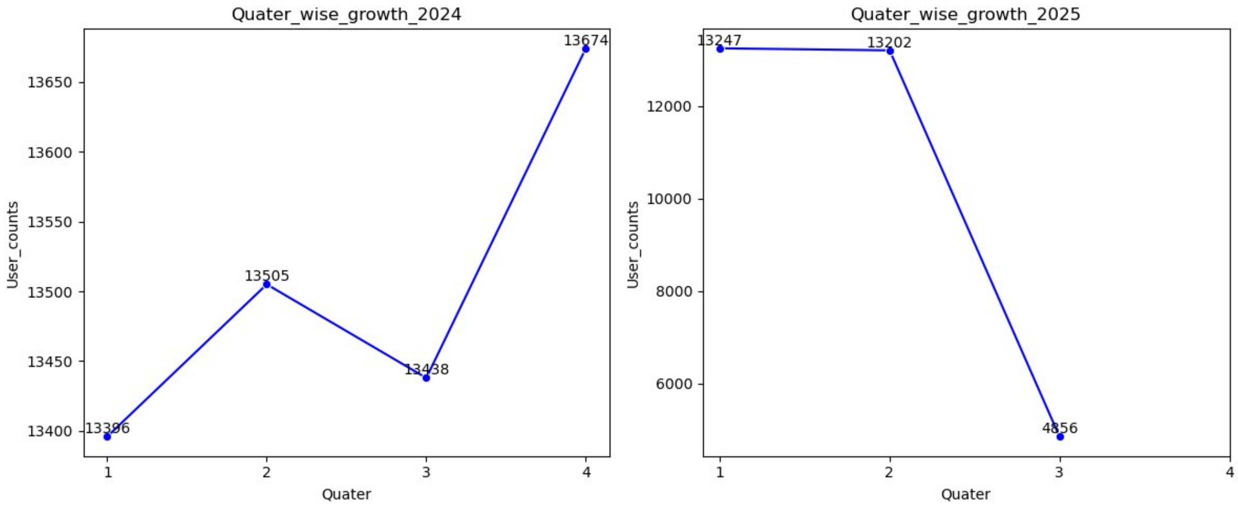
EDA

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

df=pd.read_excel(r"C:\Users\ishav\Downloads\Phonepe-Final-
Dataset.xlsx",sheet_name=None)

data=df["All_Users"]
# data.head(10)
# EDA
# data.rename(columns={"Name":"Full_name"},inplace=True)
# data["Year"]=data["Join_Date"].dt.year
# data["Quater"]=data["Join_Date"].dt.quarter
# data["Month"]=data["Join_Date"].dt.month
# data[data.duplicated()]
# data.drop_duplicates(inplace=True)
# data.isnull().sum()
# data.info()
# data.describe()
# plt.boxplot(data["Age"]) // there is no outliers
# # plt.hist(data["Age"],bins=20)

# Year_wise_growth
plt.figure(figsize=(12,5))
plt.subplot(1,2,1)
year_wise_users=data.groupby("Year")["User_ID"].count().reset_index()
sns.lineplot(data=year_wise_users,x="Year",y="User_ID",marker="o",colo
r="blue")
plt.title("Year_wise_growth")
plt.xlabel("Year")
plt.ylabel("User_counts")
for i,values in
zip(year_wise_users["Year"],year_wise_users["User_ID"]):
    plt.text(i,values,str(values),ha="center",va="bottom")
plt.xticks(year_wise_users["Year"])



# quarter-wise_growth
# plt.subplot(1,2,2)
# year_wise_users=data.groupby("Quater")
["User_ID"].count().reset_index()
#
sns.lineplot(data=year_wise_users,x="Quater",y="User_ID",marker="o",co
lor="blue")
# plt.title("Quater_wise_groeth")
# plt.xlabel("Quater")
# plt.ylabel("User_counts")
# for i,values in
zip(year_wise_users["Quater"],year_wise_users["User_ID"]):
#     plt.text(i,values,str(values),ha="center",va="bottom")
# plt.xticks(year_wise_users["Quater"])
# plt.tight_layout()
```

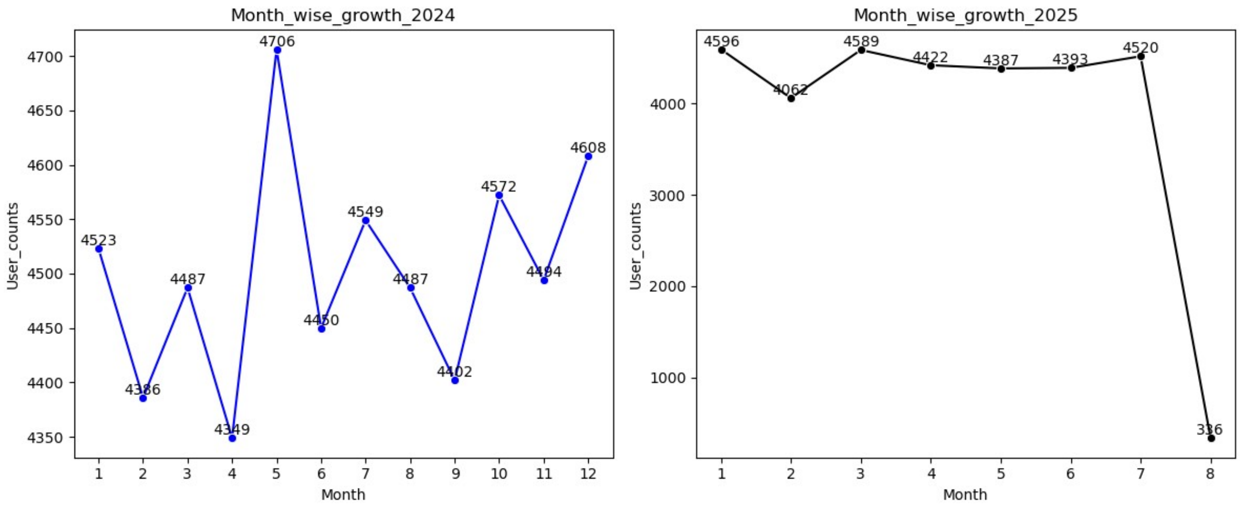
```
([<matplotlib.axis.XTick at 0x1d976e21590>,
  <matplotlib.axis.XTick at 0x1d976dd8050>,
  <matplotlib.axis.XTick at 0x1d976dd87d0>],
 [Text(2023, 0, '2023'), Text(2024, 0, '2024'), Text(2025, 0,
'2025')])
```



```
def Compare_month_quater_users_growth(data):
    def Quater_growths_2024():
        plt.figure(figsize=(12,5))
        plt.subplot(1,2,1)

year_wise2024_quater_growth=data.loc[data["Year"]==2024].groupby("Quat
er")["User_ID"].count().reset_index()

sns.lineplot(data=year_wise2024_quater_growth,x="Quater",y="User_ID",m
arker="o",color="blue")
        plt.title("Quater_wise_growth_2024")
        plt.xlabel("Quater")
        plt.ylabel("User_counts")
        for i,values in
zip(year_wise2024_quater_growth["Quater"],year_wise2024_quater_growth[
"User_ID"]):
            plt.text(i,values,str(values),ha="center",va="bottom")
        plt.xticks(year_wise2024_quater_growth["Quater"])
        plt.tight_layout()

        def Quater_growths_2025():
            plt.subplot(1,2,2)

year_wise2025_quater_growth=data.loc[data["Year"]==2025].groupby("Quat
er")["User_ID"].count().reset_index()

sns.lineplot(data=year_wise2025_quater_growth,x="Quater",y="User_ID",m
arker="o",color="blue")
            plt.title("Quater_wise_growth_2025")
            plt.xlabel("Quater")
            plt.ylabel("User_counts")
            for i,values in
zip(year_wise2025_quater_growth["Quater"],year_wise2025_quater_growth[
"User_ID"]):
                plt.text(i,values,str(values),ha="center",va="bottom")
            plt.xticks(year_wise2024_quater_growth["Quater"])
            plt.tight_layout()
            plt.show()
        Quater_growths_2025()
    Quater_growths_2024()

Compare_month_quater_users_growth(data)
```



```
def Compare_month_quater_users_growth(data):
    def Month_growths_2024():
        plt.figure(figsize=(12,5))
        plt.subplot(1,2,1)

year_wise2024_Month_growth=data.loc[data["Year"]==2024].groupby("Month
")["User_ID"].count().reset_index()

sns.lineplot(data=year_wise2024_Month_growth,x="Month",y="User_ID",mar
ker="o",color="blue")
        plt.title("Month_wise_growth_2024")
        plt.xlabel("Month")
        plt.ylabel("User_counts")
        for i,values in
zip(year_wise2024_Month_growth["Month"],year_wise2024_Month_growth["Us
er_ID"]):
            plt.text(i,values,str(values),ha="center",va="bottom")
        plt.xticks(year_wise2024_Month_growth["Month"])
        plt.tight_layout()

        def Month_growths_2025():
            plt.subplot(1,2,2)

year_wise2024_Month_growth=data.loc[data["Year"]==2025].groupby("Month
")["User_ID"].count().reset_index()

sns.lineplot(data=year_wise2024_Month_growth,x="Month",y="User_ID",mar
ker="o",color="black")
            plt.title("Month_wise_growth_2025")
            plt.xlabel("Month")
            plt.ylabel("User_counts")
            for i,values in
zip(year_wise2024_Month_growth["Month"],year_wise2024_Month_growth["Us
er_ID"]):
                plt.text(i,values,str(values),ha="center",va="bottom")
            plt.xticks(year_wise2024_Month_growth["Month"])
            plt.tight_layout()
            plt.show()
        Month_growths_2025()
    Month_growths_2024()

Compare_month_quater_users_growth(data)
```



```
# EDA
transaction_sheet=df["All_Transactions"]
transaction_sheet.head(10)
transaction_sheet.info()
transaction_sheet["Service Type"]=transaction_sheet["Service
Type"].replace("To Mobile Number","Mobile Number")

Service_Type_EDA=transaction_sheet.groupby("Service
Type").agg({"Amount":["mean","count"]})
Service_Type_EDA
Service_EDA=transaction_sheet.groupby("Service").agg({"Amount":
["mean","count"]})
Service_EDA
```

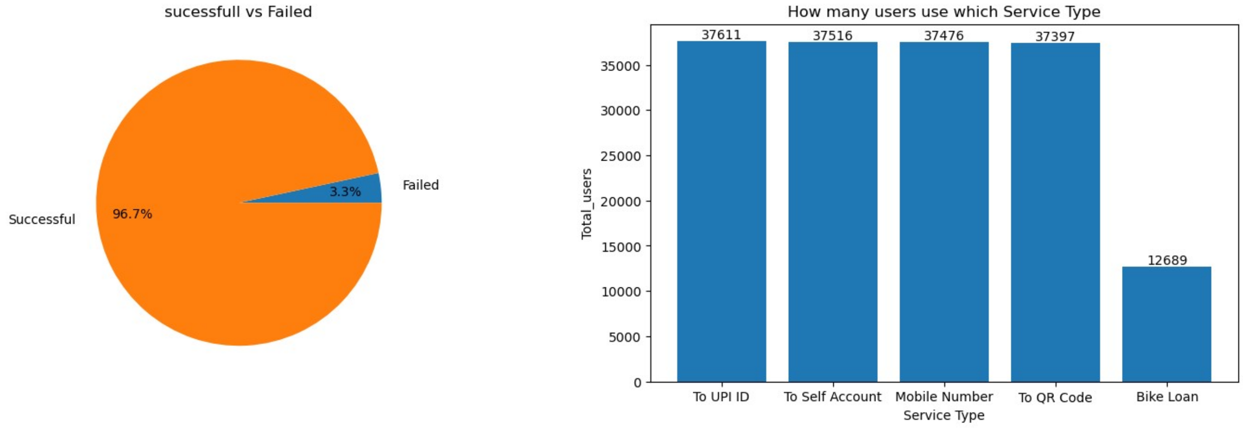
```
                      Amount
                        mean   count
Service
Insurance       10258.459314   50000
Loans           50650.187255   50000
Money_Transfer   2521.297548  150000
Recharge_Bills   1013.899470   50000
```

```
# outliers

# plt.boxplot(transaction_sheet['Amount'])
# plt.show()

transaction_sheet['Amount'].describe()
q1=transaction_sheet['Amount'].quantile(0.25)
q3=transaction_sheet['Amount'].quantile(0.75)

iqr=q3-q1
lower_bound=q1-1.5*iqr
upper_bound=q3+1.5*iqr
```

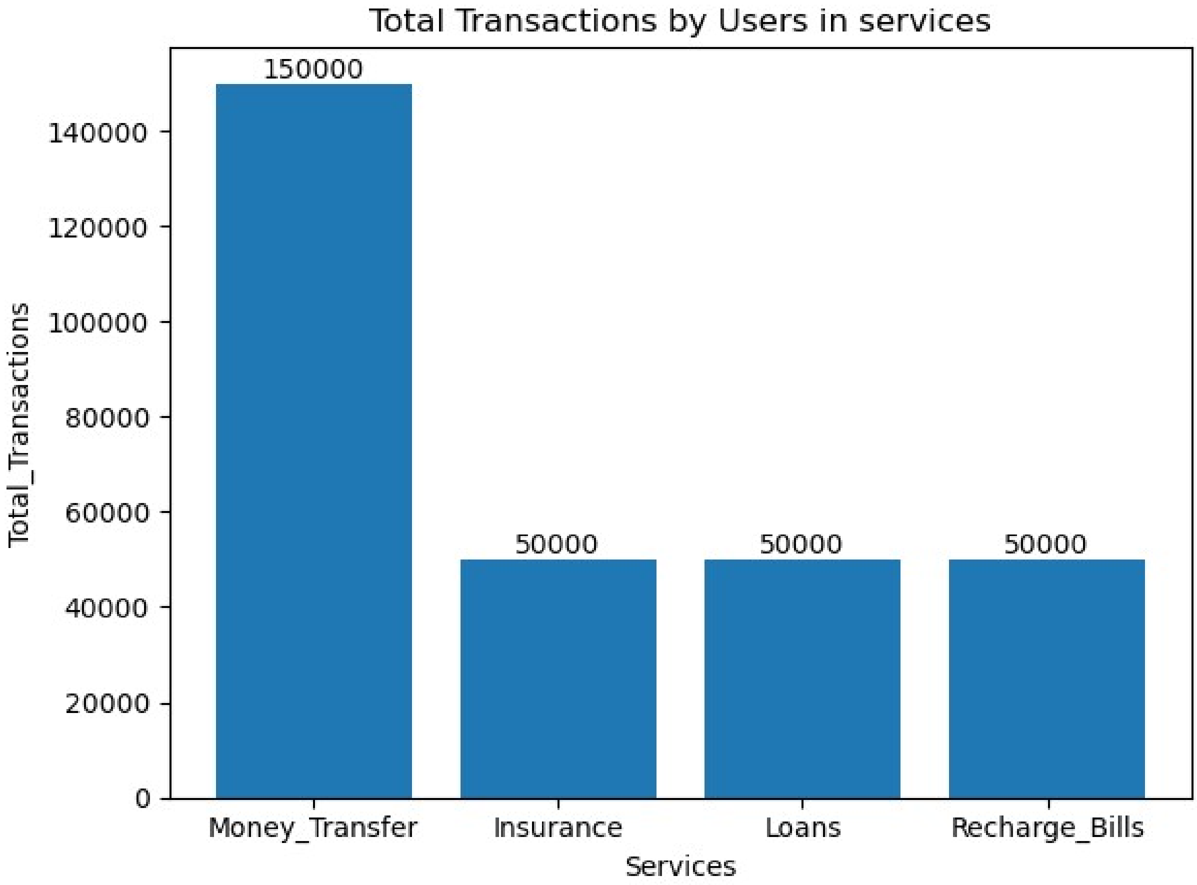
```python
outliers=transaction_sheet[(transaction_sheet["Amount"]<lower_bound)|(transaction_sheet["Amount"]>upper_bound)]
print("Total outliers:", outliers.shape[0])
```

```
Total outliers: 40779
```

```python
# sucessfull vs faield
plt.figure(figsize=(18,5))
plt.subplot(1,2,1)
failed=transaction_sheet.loc[(transaction_sheet["Payment_Status"]=="Failed")|(transaction_sheet["Payment_Status"]=="Successful")].groupby("Payment_Status").size().reset_index(name="count")
plt.pie(failed["count"],labels=failed["Payment_Status"],autopct="%1.1f%%",labeldistance=1.15,pctdistance=0.75)
plt.title("sucessfull vs Failed")




# how many users use which servies
plt.subplot(1,2,2)
service_counts=transaction_sheet.groupby("Service Type")["User_ID"].count().reset_index()
sort_by_services=service_counts.sort_values(by="User_ID",ascending=False).head(5)
plt.bar(sort_by_services["Service Type"],sort_by_services["User_ID"])
plt.title("How many users use which Service Type")
plt.xlabel("Service Type")
plt.ylabel("Total_users")
for i,values in zip(sort_by_services["Service Type"],sort_by_services["User_ID"]):
    plt.text(i,values,str(values),ha="center",va="bottom")
plt.show()
```



```
service_counts=transaction_sheet.groupby("Service")["Transaction_ID"].count().reset_index()
sort_by_services=service_counts.sort_values(by="Transaction_ID",ascending=False)
plt.bar(sort_by_services["Service"],sort_by_services["Transaction_ID"])
plt.title("Total Transactions by Users in services")
plt.xlabel("Services")
plt.ylabel("Total_Transactions")
for i,values in zip(sort_by_services["Service"],sort_by_services["Transaction_ID"]):
    plt.text(i,values,str(values),ha="center",va="bottom")
plt.tight_layout()
plt.show()
```



```
money_transfer_data=df["Money_Transfer"]
money_transfer_data.head(10)
```

```
     Transaction_ID    User_ID     Transfer_Type   Amount
Date  \
0  MTX_E258FAF7C042  PP1068692   To Self Account  1678.20 2024-02-09
```

```
1  MTX_80B43327CBE4  PP0021745  To Mobile Number  2195.34 2024-06-03

2  MTX_D61559C04F15  PP0017430        To QR Code  1934.94 2024-01-07

3  MTX_693373EE78A6  PP1099074         To UPI ID  1975.31 2024-10-06

4  MTX_D3AF01B270AF  PP1054775   To Self Account  1870.31 2024-07-27

5  MTX_0F1F22B6DF76  PP0015185  To Mobile Number   533.89 2024-12-23

6  MTX_A9AA0DEA2BFB  PP0040208         To UPI ID  2913.73 2024-10-28

7  MTX_80D6D3CEB502  PP1096695  To Mobile Number  2894.06 2024-09-04

8  MTX_198505B228FA  PP1067686  To Mobile Number  2801.24 2024-02-02

9  MTX_AD8002BECE92  PP1065648  To Mobile Number  4387.23 2024-12-01


  Payment_Status               Reason
0     Successful           Successful
1     Successful           Successful
2     Successful           Successful
3     Successful           Successful
4     Successful           Successful
5     Successful           Successful
6     Successful           Successful
7     Successful           Successful
8         Failed  Insufficient amount
9     Successful           Successful
```

```
# EDA


money_transfer_data.info()
money_transfer_data["year"]=money_transfer_data["Date"].dt.year
money_transfer_data["month"]=money_transfer_data["Date"].dt.month
money_transfer_data["quater"]=money_transfer_data["Date"].dt.quarter
money_transfer_data["Weekdays"]=money_transfer_data["Date"].dt.day_nam
e()
money_transfer_data.isnull().sum()
money_transfer_data.duplicated().sum()
money_transfer_data.drop_duplicates(inplace=True)
money_transfer_data.head(10)
money_transfer_data.describe()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150000 entries, 0 to 149999
Data columns (total 11 columns):
 #   Column          Non-Null Count   Dtype
---  ------          --------------   -----
```

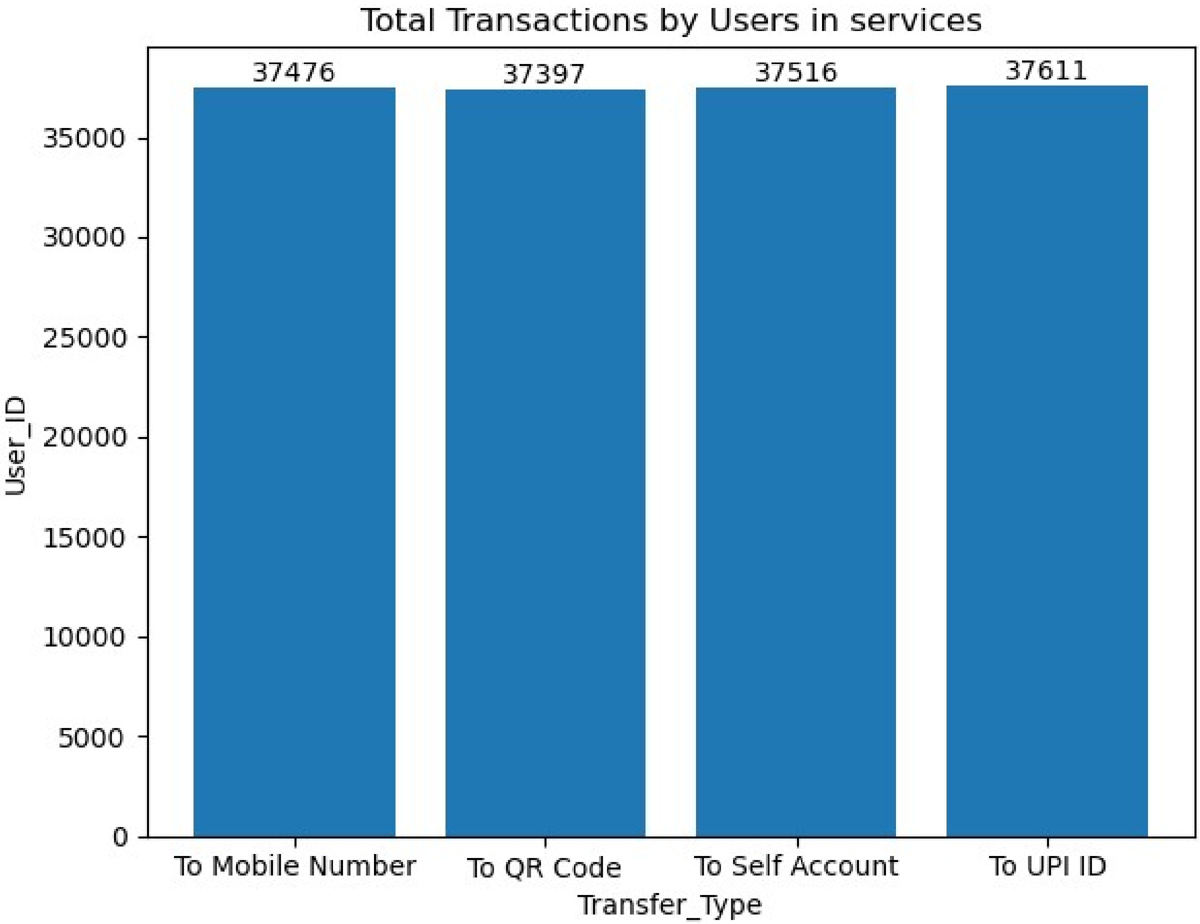
```
 0   Transaction_ID  150000 non-null  object        
 1   User_ID         150000 non-null  object        
 2   Transfer_Type   150000 non-null  object        
 3   Amount          150000 non-null  float64       
 4   Date            150000 non-null  datetime64[ns]
 5   Payment_Status  150000 non-null  object        
 6   Reason          150000 non-null  object        
 7   year            150000 non-null  int32         
 8   month           150000 non-null  int32         
 9   quater          150000 non-null  int32         
 10  Weekdays        150000 non-null  object        
dtypes: datetime64[ns](1), float64(1), int32(3), object(6)
memory usage: 10.9+ MB

              Amount                           Date      year  
month  \
count  150000.000000                         150000  150000.0   
150000.000000   
mean     2521.297548  2024-07-01 04:24:16.703999744    2024.0   
6.504680   
min        50.040000            2024-01-01 00:00:00    2024.0   
1.000000   
25%      1288.727500            2024-04-01 00:00:00    2024.0   
4.000000   
50%      2522.350000            2024-07-01 00:00:00    2024.0   
7.000000   
75%      3760.200000            2024-10-01 00:00:00    2024.0   
10.000000   
max      4999.990000            2024-12-30 00:00:00    2024.0   
12.000000   
std      1429.210487                            NaN       0.0   
3.448252   

              quater  
count  150000.000000  
mean        2.503467  
min         1.000000  
25%         2.000000  
50%         3.000000  
75%         4.000000  
max         4.000000  
std         1.117913  
```

```python
# outliers()
# IQR
q1=money_transfer_data["Amount"].quantile(0.25)
q3=money_transfer_data["Amount"].quantile(0.75)

Iqr=q3-q1
lower_bound=q1-1.5*Iqr
```

```
upper_bound=q3+1.5*Iqr

outliers=money_transfer_data[(money_transfer_data["Amount"]<lower_bound)|(money_transfer_data["Amount"]>upper_bound)]
print(outliers.shape[0])
```

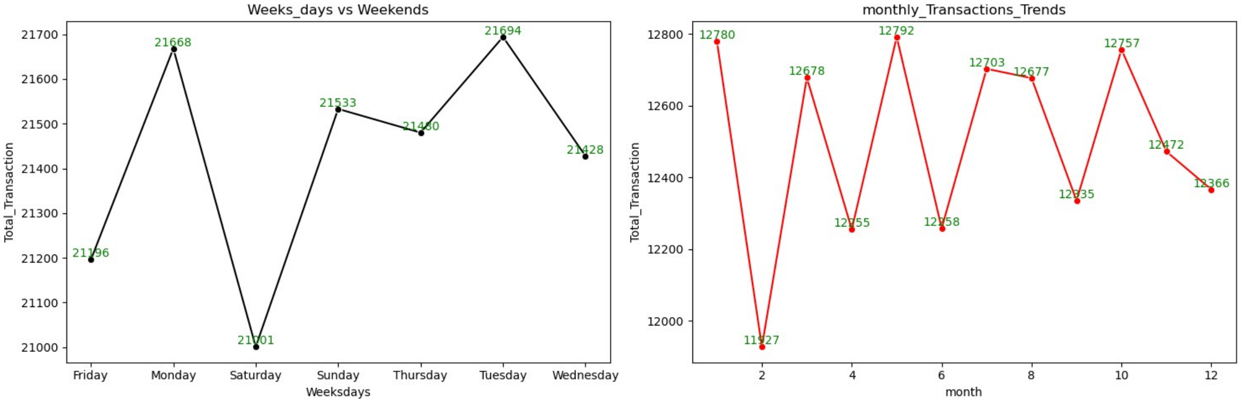
```
0
```

```
plt.figure(figsize=(12,5))
plt.subplot(1,2,1)
Transfer_type_group=money_transfer_data.groupby("Transfer_Type")["User_ID"].count().reset_index()
sort_by_services=Transfer_type_group.sort_values(by="User_ID",ascending=False)
plt.bar(Transfer_type_group["Transfer_Type"],Transfer_type_group["User_ID"])
plt.title("Total Transactions by Users in services")
plt.xlabel("Transfer_Type")
plt.ylabel("User_ID")
for i,values in zip(Transfer_type_group["Transfer_Type"],Transfer_type_group["User_ID"]):
    plt.text(i,values,str(values),ha="center",va="bottom")
plt.tight_layout()
plt.show()
```

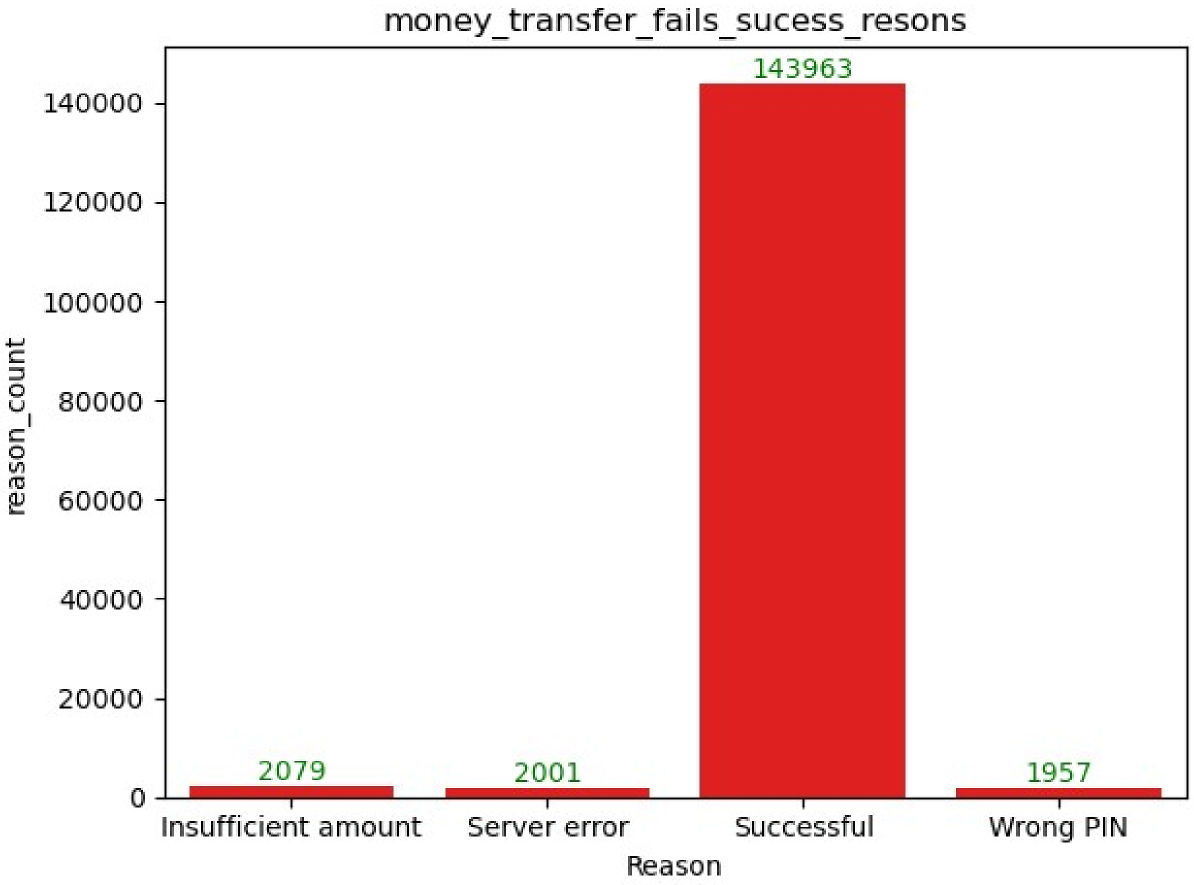


```
# money_transfer_data.head(10)

# Weeks_days vs Weekends
plt.figure(figsize=(15,5))
plt.subplot(1,2,1)
weekends_weekdays=money_transfer_data.groupby("Weekdays")
["Transaction_ID"].count().reset_index()
sns.lineplot(data=weekends_weekdays,x="Weekdays",y="Transaction_ID",ma
rker="o",color="black")
plt.title("Weeks_days vs Weekends")
plt.xlabel("Weeksdays")
plt.ylabel("Total_Transaction")
for i,values in
zip(weekends_weekdays["Weekdays"],weekends_weekdays["Transaction_ID"])
:

plt.text(i,values,str(values),ha="center",va="bottom",color="green")
plt.tight_layout()

# monthly_Transactions_Trends
plt.subplot(1,2,2)
```

```
weekends_weekdays=money_transfer_data.groupby("month")
["Transaction_ID"].count().reset_index()
sns.lineplot(data=weekends_weekdays,x="month",y="Transaction_ID",marke
r="o",color="red")
plt.title("monthly_Transactions_Trends")
plt.xlabel("month")
plt.ylabel("Total_Transaction")
for i,values in
zip(weekends_weekdays["month"],weekends_weekdays["Transaction_ID"]):

plt.text(i,values,str(values),ha="center",va="bottom",color="green")
plt.tight_layout()
plt.show()
plt.show()
```



```
# money_trasnfer_fails

money_trasnfer_fails_sucess_resons=money_transfer_data.groupby("Reason
")["Reason"].size().reset_index(name="reason_count")
sns.barplot(data=money_trasnfer_fails_sucess_resons,x="Reason",y="reas
on_count",color="red")
plt.title("money_transfer_fails_sucess_resons")
plt.xlabel("Reason")
plt.ylabel("reason_count")
for i,values in
zip(money_trasnfer_fails_sucess_resons["Reason"],money_trasnfer_fails_
sucess_resons["reason_count"]):

plt.text(i,values,str(values),ha="center",va="bottom",color="green")
plt.tight_layout()
plt.show()
plt.show()
```



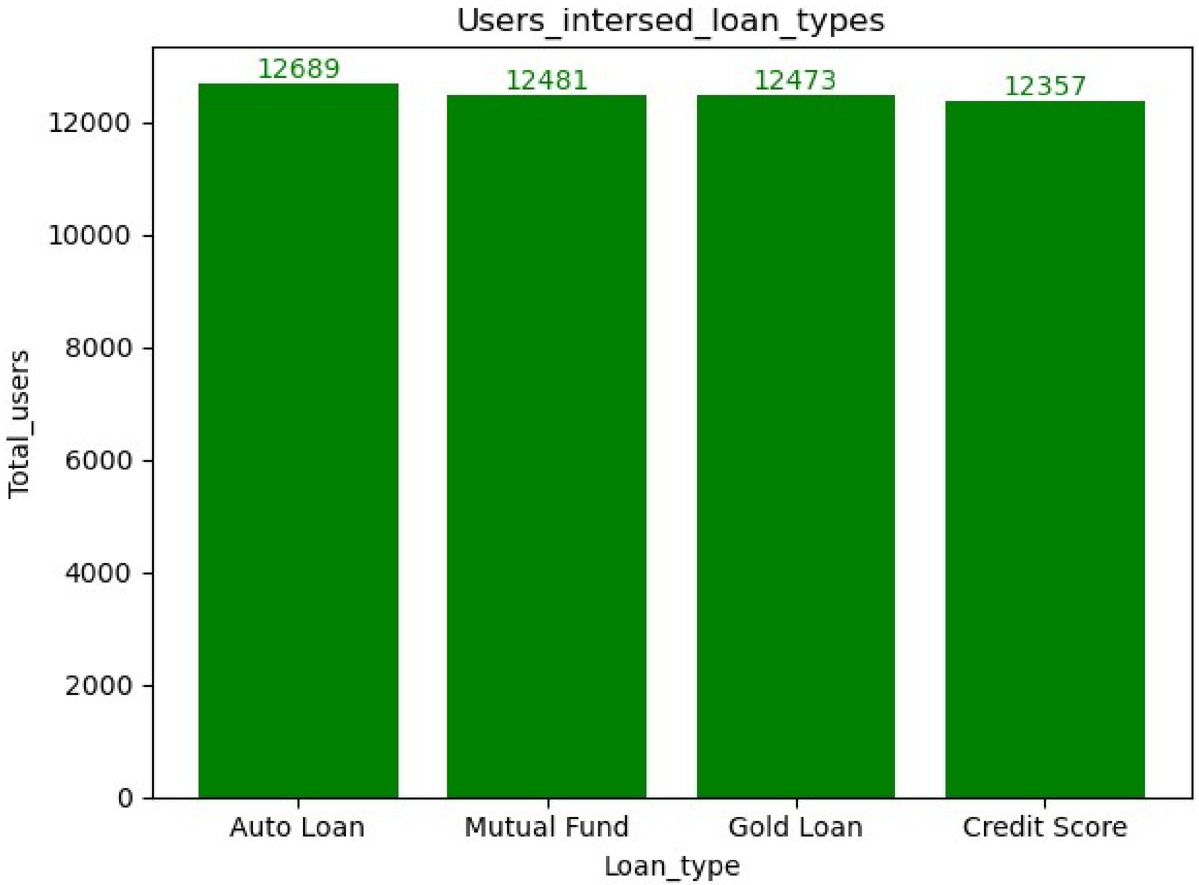
```
# EDA
Loans_data=df["Loans"]
Loans_data["year"]=Loans_data["Date"].dt.year
Loans_data["month"]=Loans_data["Date"].dt.month
Loans_data.info()
Loans_data.describe()
Loans_data.isnull().sum()
Loans_data.duplicated().sum()
Loans_data.drop_duplicates()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 50000 entries, 0 to 49999
Data columns (total 9 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Transaction_ID  50000 non-null  object
 1   User_ID         50000 non-null  object
 2   Loan_Type       50000 non-null  object
 3   Loan_Amount     50000 non-null  float64
 4   Date            50000 non-null  datetime64[ns]
 5   Payment_Status  50000 non-null  object
 6   Reason          50000 non-null  object
 7   year            50000 non-null  int32
 8   month           50000 non-null  int32
dtypes: datetime64[ns](1), float64(1), int32(2), object(5)
memory usage: 3.1+ MB

         Transaction_ID    User_ID    Loan_Type  Loan_Amount
Date  \
0      LON_1329C39D026B  PP1057315    Gold Loan     71162.95 2024-01-
20
1      LON_AA5EB40B65D8  PP0044616  Mutual Fund     40957.29 2024-10-
26
2      LON_9AED5B360DA3  PP1073567  Mutual Fund     31208.04 2024-04-
11
3      LON_0F4FE9465FF6  PP0042929    Auto Loan     23149.14 2024-10-
17
4      LON_A4676711FB3E  PP0034329  Mutual Fund     47599.00 2024-04-
08
...                 ...        ...          ...          ...         ..
.
49995  LON_3C932033E350  PP0026300    Auto Loan     35620.89 2024-03-
28
49996  LON_A8F0CB407FD9  PP1049128    Gold Loan     62187.35 2024-05-
15
49997  LON_0B5C9C798BB0  PP1054678  Mutual Fund     90890.79 2024-09-
27
49998  LON_0CB9540E414C  PP1067685    Gold Loan     12809.96 2024-11-
04
49999  LON_BDD54518A3BB  PP1051834  Mutual Fund     28134.45 2024-12-
09

      Payment_Status      Reason  year  month
0         Successful  Successful  2024      1
1         Successful  Successful  2024     10
2         Successful  Successful  2024      4
3         Successful  Successful  2024     10
4         Successful  Successful  2024      4
...              ...         ...   ...    ...
49995     Successful  Successful  2024      3
49996     Successful  Successful  2024      5
49997     Successful  Successful  2024      9
49998     Successful  Successful  2024     11
49999     Successful  Successful  2024     12

[50000 rows x 9 columns]

# outliers

q1=Loans_data["Loan_Amount"].quantile(0.25)
q3=Loans_data["Loan_Amount"].quantile(0.75)
```

```
iqr=q3-q1
lower_bound=q1-1.5*iqr
upper_bound=q3+1.5*iqr

outliers=Loans_data[(Loans_data["Loan_Amount"]<lower_bound)|
(Loans_data["Loan_Amount"]>upper_bound)]
print(outliers.shape[0])
```

```
0
```

```
loan_type_group=Loans_data.groupby("Loan_Type")
["User_ID"].count().reset_index()
sort_by_users=loan_type_group.sort_values(by="User_ID",ascending=False
)
plt.bar(sort_by_users["Loan_Type"],sort_by_users["User_ID"],color="gre
en")
plt.title("Users_intersed_loan_types")
plt.xlabel("Loan_type")
plt.ylabel("Total_users")
for i,values in
zip(sort_by_users["Loan_Type"],sort_by_users["User_ID"]):

plt.text(i,values,str(values),ha="center",va="bottom",color="green")
plt.tight_layout()
plt.show()
```



```
Loan_amount_details=Loans_data.groupby("Loan_Type").agg({"Loan_Amount"
:["mean","sum","min","max"]})
Loan_amount_details

Loan_amount_details_by_year=Loans_data.groupby("year").agg({"User_ID":
["count","min","max"]})
Loan_amount_details_by_year

Loan_amount_details_by_Users=Loans_data.groupby("User_ID")
["Loan_Amount"].sum().reset_index()
Loan_amount_details_by_Users_sort_top_10=Loan_amount_details_by_Users.
sort_values(by="Loan_Amount",ascending=False).head(10)
Loan_amount_details_by_Users_sort_top_10

Loan_amount_details_by_Users=Loans_data.groupby("User_ID")
["Loan_Amount"].sum().reset_index()
Loan_amount_details_by_Users_sort_bottom_10=Loan_amount_details_by_Use
rs.sort_values(by="Loan_Amount",ascending=True).head(10)
Loan_amount_details_by_Users_sort_bottom_10

        User_ID  Loan_Amount
4417  PP0012266      1002.16
```

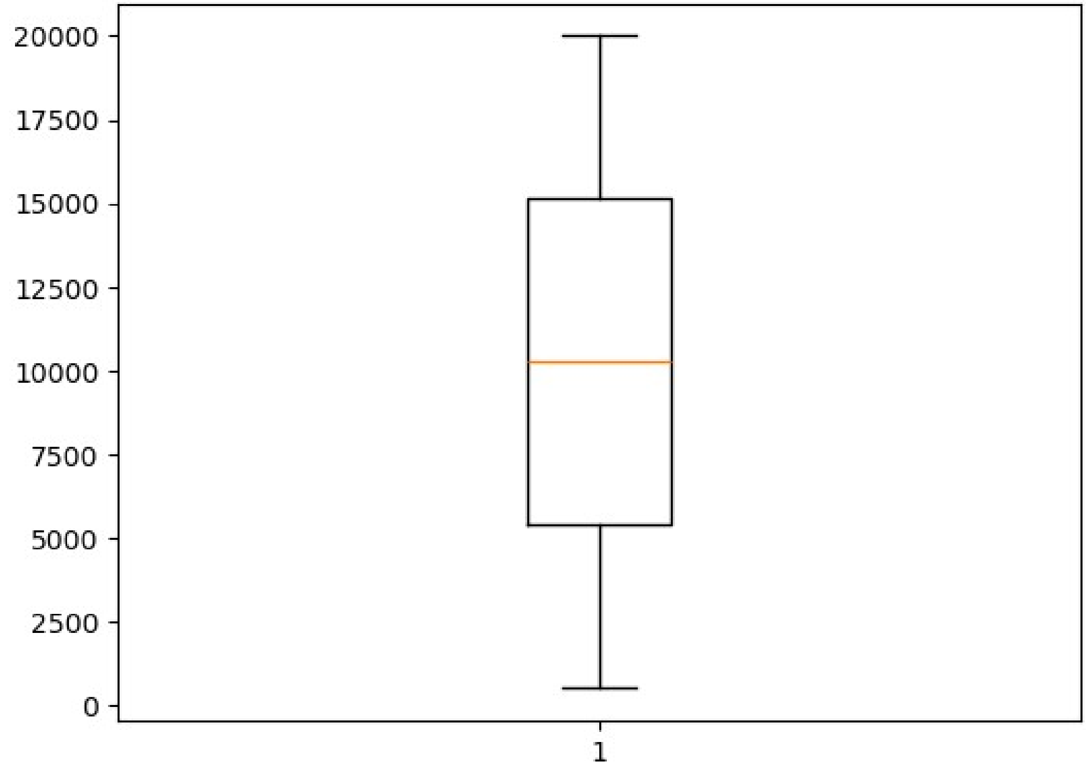
```
29784  PP1080807      1004.93
16086  PP0044376      1007.08
29229  PP1079314      1009.18
8752   PP0024170      1010.41
11740  PP0032467      1013.54
12877  PP0035557      1019.54
10413  PP0028783      1025.70
13572  PP0037434      1025.78
5704   PP0015920      1028.63
```

```
# EDA
insurance_data=df["Insurance"]
insurance_data["year"]=insurance_data["Date"].dt.year
insurance_data["month"]=insurance_data["Date"].dt.month
insurance_data.info()
insurance_data.describe()
insurance_data.isnull().sum()
insurance_data.duplicated().sum()
insurance_data.drop_duplicates()
```

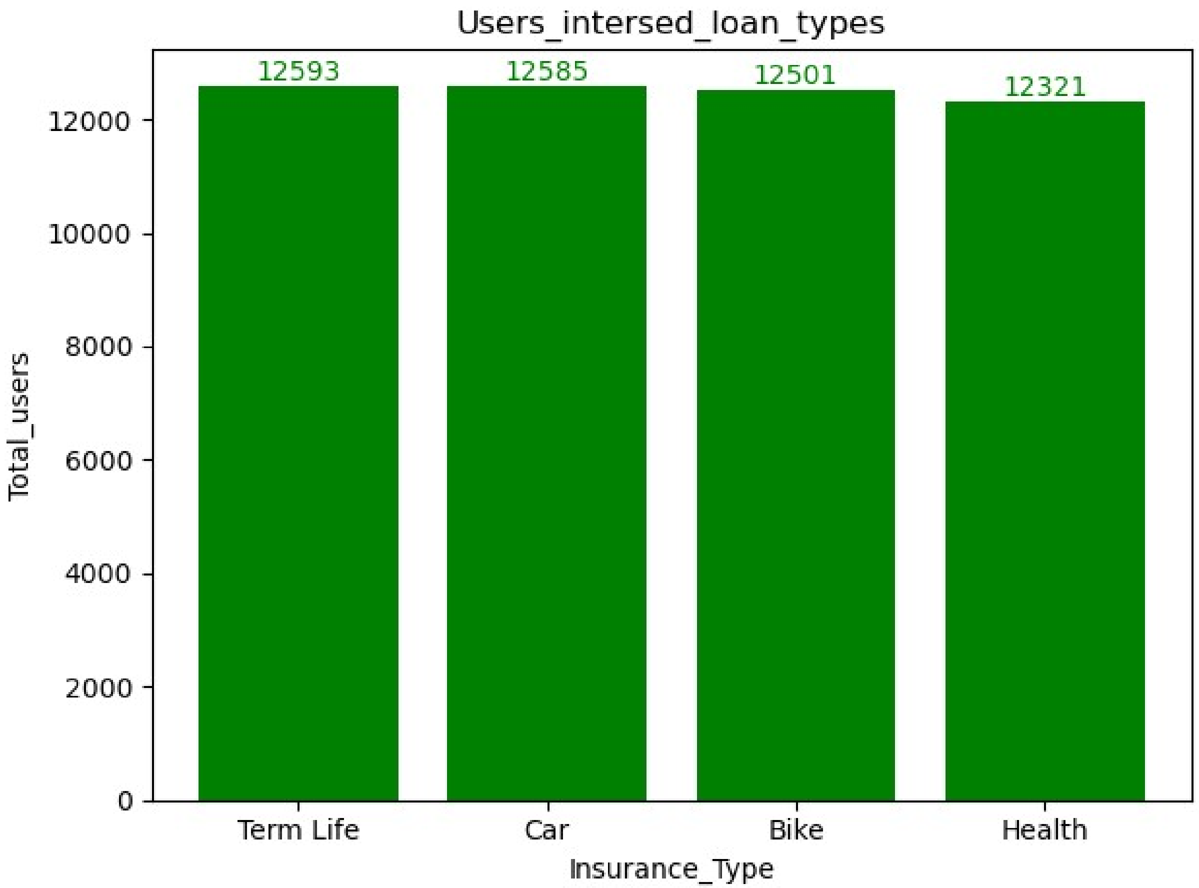
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 50000 entries, 0 to 49999
Data columns (total 9 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Transaction_ID  50000 non-null  object
 1   User_ID         50000 non-null  object
 2   Insurance_Type  50000 non-null  object
 3   Premium         50000 non-null  float64
 4   Date            50000 non-null  datetime64[ns]
 5   Payment_Status  50000 non-null  object
 6   Reason          50000 non-null  object
 7   year            50000 non-null  int32
 8   month           50000 non-null  int32
dtypes: datetime64[ns](1), float64(1), int32(2), object(5)
memory usage: 3.1+ MB
```

```
            Premium                           Date     year
month
count  50000.000000                          50000  50000.0
50000.00000
mean   10258.459314  2024-07-01 01:05:31.199999744   2024.0
6.50010
min      500.180000            2024-01-01 00:00:00   2024.0
1.00000
25%     5393.437500            2024-04-01 00:00:00   2024.0
4.00000
50%    10278.525000            2024-07-01 00:00:00   2024.0
7.00000
75%    15141.870000            2024-09-30 00:00:00   2024.0
```

```
9.00000
max    19999.510000            2024-12-30 00:00:00   2024.0
12.00000
std     5628.229842                            NaN      0.0
3.44161

# outliers

q1=insurance_data["Premium"].quantile(0.25)
q3=insurance_data["Premium"].quantile(0.75)

iqr=q3-q1
lower_bound=q1-1.5*iqr
upper_bound=q3+1.5*iqr

outliers=insurance_data[(insurance_data["Premium"]<lower_bound)|
(insurance_data["Premium"]>upper_bound)]
print(outliers.shape[0])

plt.boxplot(insurance_data["Premium"])
plt.show()

0
```

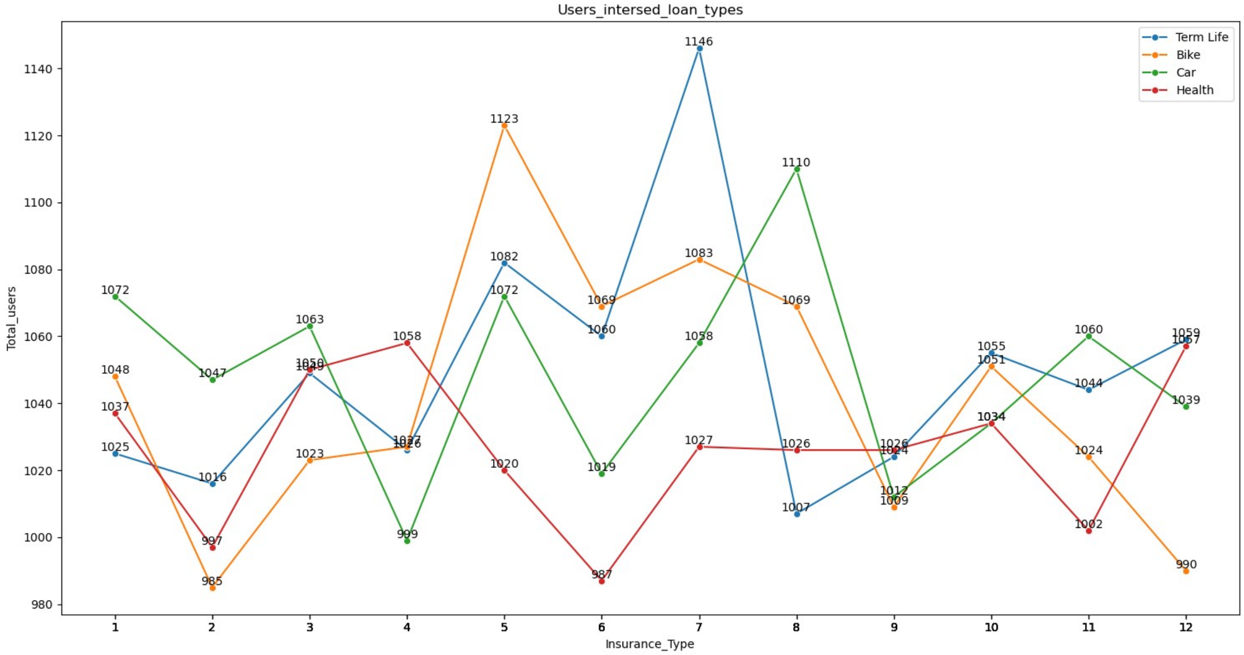


```
insurance_type_group=insurance_data.groupby("Insurance_Type")
["User_ID"].count().reset_index()
sort_by_users=insurance_type_group.sort_values(by="User_ID",ascending=
False)
plt.bar(sort_by_users["Insurance_Type"],sort_by_users["User_ID"],color
="green")
plt.title("Users_intersed_loan_types")
plt.xlabel("Insurance_Type")
plt.ylabel("Total_users")
for i,values in
zip(sort_by_users["Insurance_Type"],sort_by_users["User_ID"]):

plt.text(i,values,str(values),ha="center",va="bottom",color="green")
plt.tight_layout()
plt.show()
```



```
plt.figure(figsize=(15,8))
year_wise_insurance_types=insurance_data.groupby(["month","Insurance_T
ype"])["Transaction_ID"].count().reset_index()
sort_by_year=year_wise_insurance_types.sort_values(by="Transaction_ID"
,ascending=False)
```

```
sns.lineplot(data=sort_by_year,x="month",y="Transaction_ID",color="sky
blue",marker="o",hue="Insurance_Type")
plt.title("Users_intersed_loan_types")
plt.legend()
plt.xlabel("Insurance_Type")
plt.ylabel("Total_users")
for i,values in
zip(sort_by_year["month"],sort_by_year["Transaction_ID"]):

plt.text(i,values,str(values),ha="center",va="bottom",color="black")
plt.tight_layout()
plt.xticks(sort_by_year["month"])
plt.show()
```


Users_intersed_loan_types
Term Life
Bike
Car
Health
Total_users
Insurance_Type