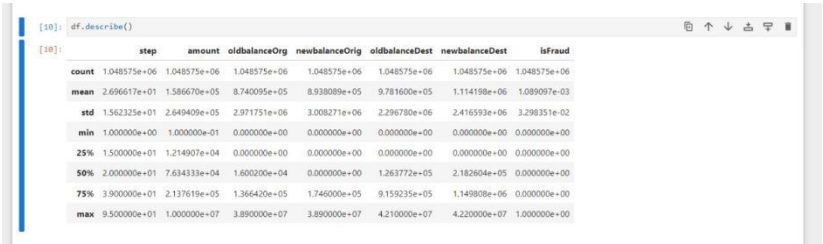
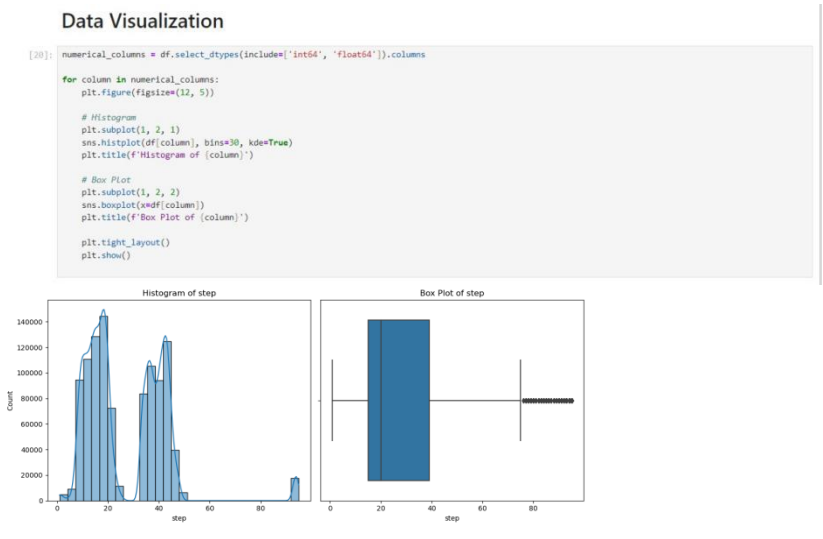
Data Collection and Preprocessing Phase

Date	15 July 2024
Team ID	team-740084
Project Title	Online Payments Fraud Detection
Maximum Marks	6 Marks

Data Exploration and Preprocessing Report

Dataset variables will be statistically analyzed to identify patterns and outliers, with Python employed for preprocessing tasks like normalization and feature engineering. Data cleaning will address missing values and outliers, ensuring quality for subsequent analysis and modeling, and forming a strong foundation for insights and predictions.

Section	Description
Data Overview	
Univariate Analysis	

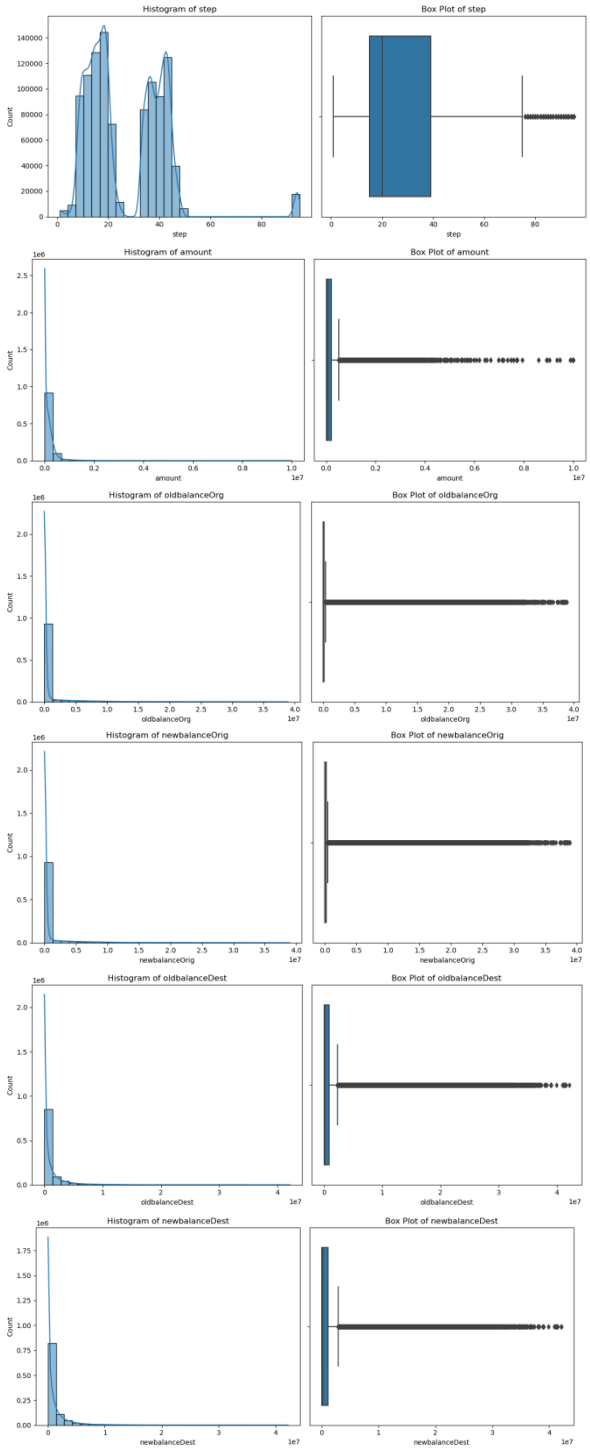
```
[10]: df.describe()
```

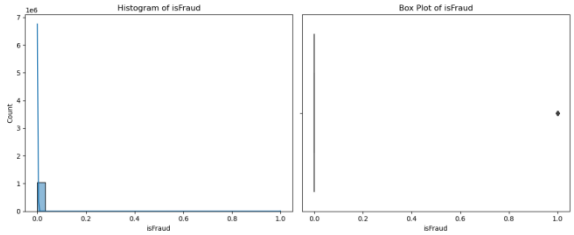
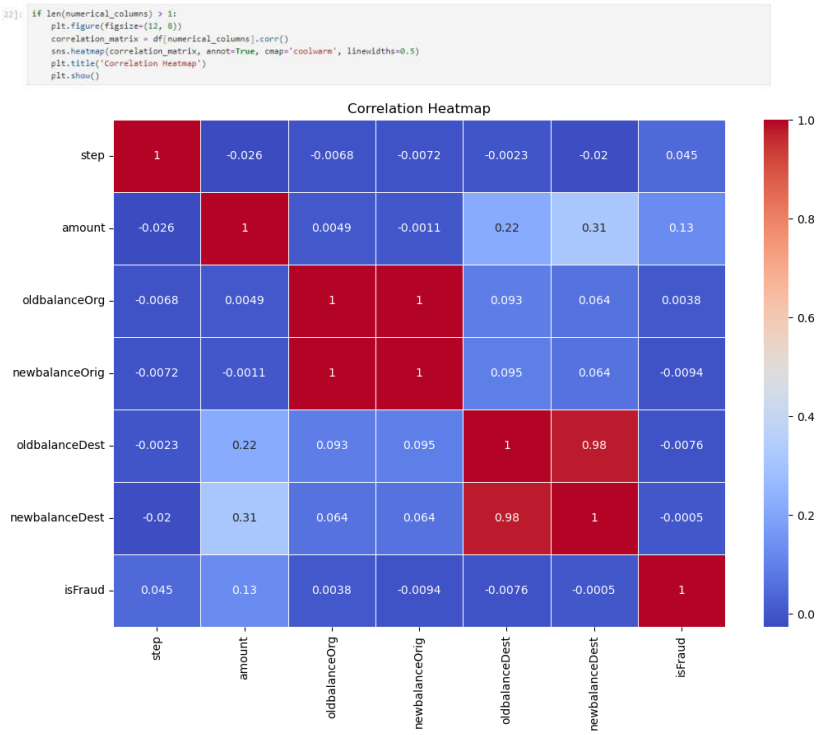
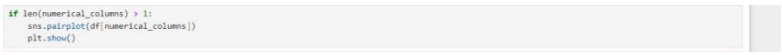
[10]:

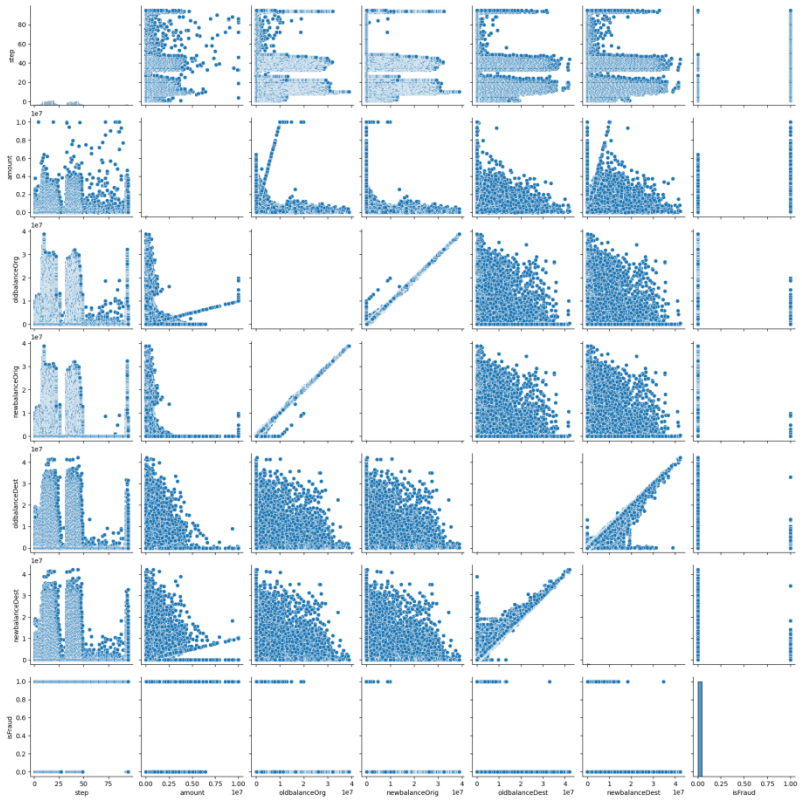
	step	amount	oldbalanceOrg	newbalanceOrig	oldbalanceDest	newbalanceDest	isFraud
count	1.048575e+06	1.048575e+06	1.048575e+06	1.048575e+06	1.048575e+06	1.048575e+06	1.048575e+06
mean	2.696617e+01	1.586670e+05	8.740095e+05	8.938089e+05	9.781600e+05	1.114198e+06	1.089097e-03
std	1.562325e+01	2.649409e+05	2.971751e+06	3.008271e+06	2.296780e+06	2.416593e+06	3.298351e-02
min	1.000000e+00	1.000000e-01	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00
25%	1.500000e+01	1.214907e+04	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00
50%	2.000000e+01	7.634333e+04	1.600200e+04	0.000000e+00	1.263772e+05	2.182604e+05	0.000000e+00
75%	3.900000e+01	2.137619e+05	1.366420e+05	1.746000e+05	9.159235e+05	1.149808e+06	0.000000e+00
max	9.500000e+01	1.000000e+07	3.890000e+07	3.890000e+07	4.210000e+07	4.220000e+07	1.000000e+00

Data Visualization

```
[20]: numerical_columns = df.select_dtypes(include=['int64', 'float64']).columns

for column in numerical_columns:
    plt.figure(figsize=(12, 5))

    # Histogram
    plt.subplot(1, 2, 1)
    sns.histplot(df[column], bins=30, kde=True)
    plt.title(f'Histogram of {column}')

    # Box Plot
    plt.subplot(1, 2, 2)
    sns.boxplot(x=df[column])
    plt.title(f'Box Plot of {column}')

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


Histogram of step
Box Plot of step
Count
step
Histogram of amount
Box Plot of amount
1e6
amount
1e7
Histogram of oldbalanceOrg
Box Plot of oldbalanceOrg
oldbalanceOrg
Histogram of newbalanceOrig
Box Plot of newbalanceOrig
newbalanceOrig
Histogram of oldbalanceDest
Box Plot of oldbalanceDest
oldbalanceDest
Histogram of newbalanceDest
Box Plot of newbalanceDest
newbalanceDest

<table>
<tr><td></td><td> 
</td></tr>
<tr><td>Bivariate Analysis</td><td>Heat Map

</td></tr>
<tr><td>Multivariate Analysis</td><td> 
</td></tr>
</table>



Data Preprocessing Code Screenshots

Loading Data

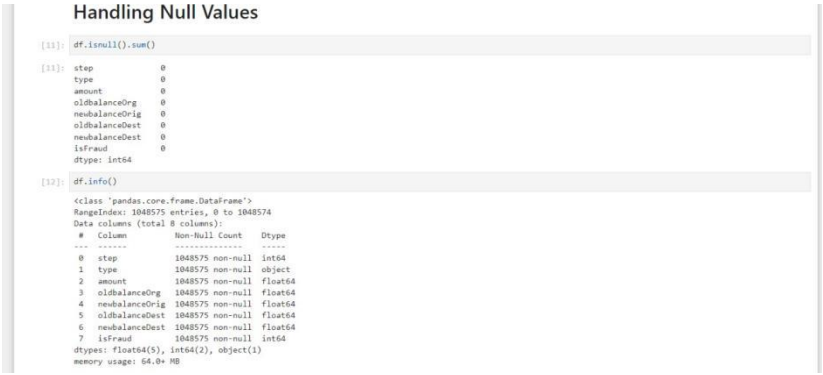
Reading the Dataset

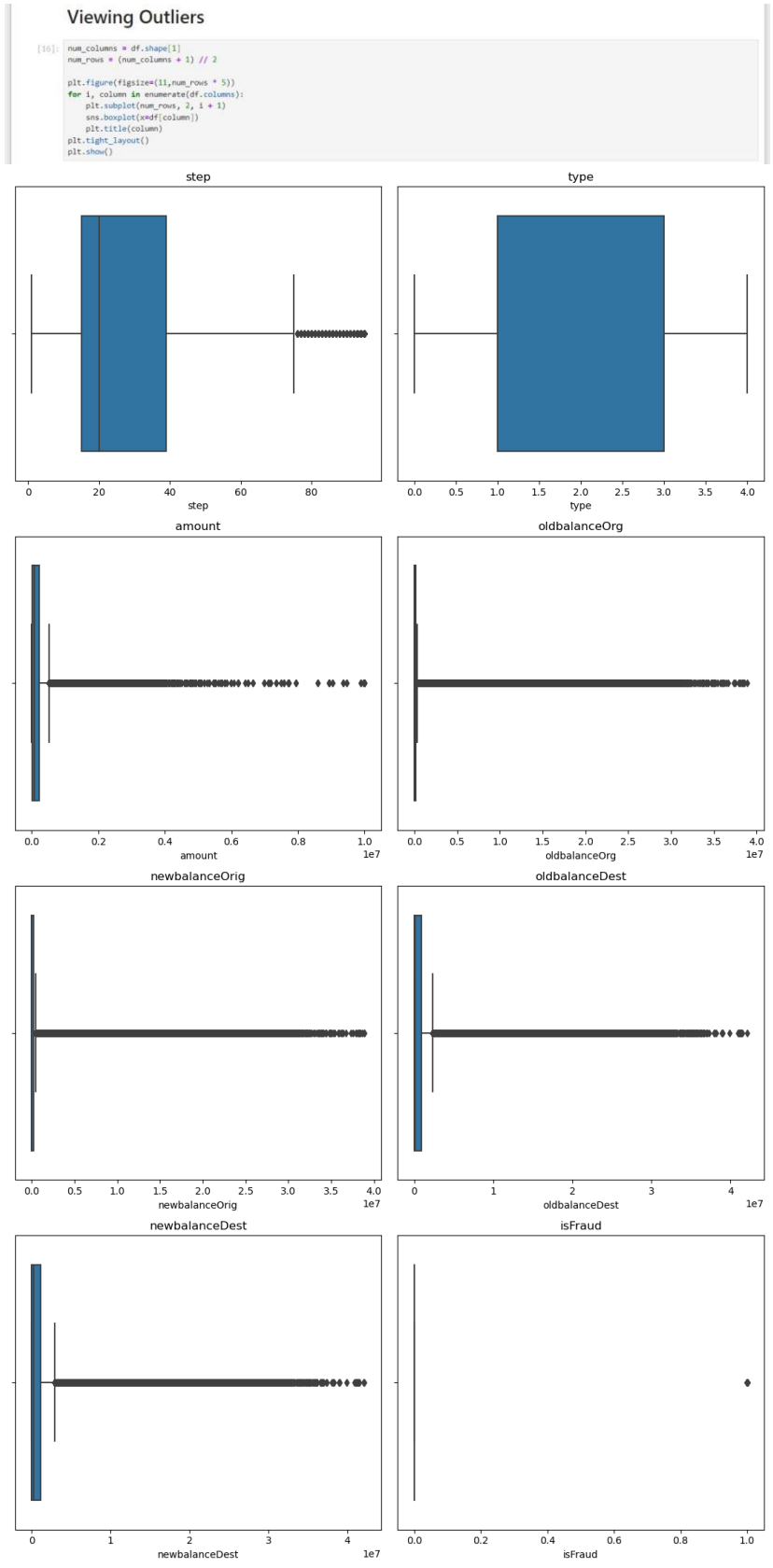
```
[3]: df=pd.read_csv('OFOdata.csv')
     df
```

[3]:

	step	type	amount	nameOrig	oldbalanceOrg	newbalanceOrig	nameDest	oldbalanceDest	newbalanceDest	isFraud	isFlaggedFraud
0	1	PAYMENT	9839.64	C1231006815	170136.00	160296.36	M1979787155	0.00	0.00	0	0
1	1	PAYMENT	1864.28	C1666544295	21249.00	19384.72	M2044282225	0.00	0.00	0	0
2	1	TRANSFER	181.00	C1305486145	181.00	0.00	C553264065	0.00	0.00	1	0
3	1	CASH_OUT	181.00	C840083671	181.00	0.00	C38997010	21182.00	0.00	1	0
4	1	PAYMENT	11668.14	C2048537720	41554.00	29885.86	M1230701703	0.00	0.00	0	0
...	...	...	...	...	...	...	...	...	...	...	...
1048570	95	CASH_OUT	132557.35	C1179511630	479803.00	347245.65	C435674507	484329.37	616886.72	0	0
1048571	95	PAYMENT	9917.36	C1956161225	90545.00	80627.64	M668364942	0.00	0.00	0	0
1048572	95	PAYMENT	14140.05	C2037964975	20545.00	6404.95	M1355182933	0.00	0.00	0	0
1048573	95	PAYMENT	10020.05	C1633237354	90605.00	80584.95	M1964992463	0.00	0.00	0	0
1048574	95	PAYMENT	11450.03	C1264356443	80584.95	69134.92	M677577406	0.00	0.00	0	0

1048575 rows × 11 columns

Handling Null Values	

Viewing outliers	

Handling outliers	
Saved Processed Data	

	step	type	amount	oldbalanceOrg	newbalanceOrig	oldbalanceDest	newbalanceDest	isFraud
count	1.048575e+06	1.048575e+06	1.048575e+06	1.048575e+06	1.048575e+06	1.048575e+06	1.048575e+06	1.048575e+06
mean	2.696617e+01	1.713400e+00	1.586670e+05	8.740095e+05	8.938089e+05	9.781600e+05	1.114198e+06	1.089097e-03
std	1.562325e+01	1.345007e+00	2.649409e+05	2.971751e+06	3.008271e+06	2.296780e+06	2.416593e+06	3.298351e-02
min	1.000000e+00	0.000000e+00	1.000000e-01	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00
25%	1.500000e+01	1.000000e+00	1.214907e+04	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00
50%	2.000000e+01	1.000000e+00	7.634333e+04	1.600200e+04	0.000000e+00	1.263772e+05	2.182604e+05	0.000000e+00
75%	3.900000e+01	3.000000e+00	2.137619e+05	1.366420e+05	1.746000e+05	9.159235e+05	1.149808e+06	0.000000e+00
max	9.500000e+01	4.000000e+00	1.000000e+07	3.890000e+07	3.890000e+07	4.210000e+07	4.220000e+07	1.000000e+00