```
# linear algebra
import numpy as np
# data processing, CSV file I/O (e.g. pd.read_csv)
import pandas as pd
import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import classification_report
import torch
from torch import nn
import torch.nn.functional as F
```

```
df = pd.read_csv("/content/drive/MyDrive/MOUNTT/creditcard.csv")
```

```
df.head()
```

	Time	V1	V2	V3	V4	V5	V6	V7	
0	0.0	-1.359807	-0.072781	2.536347	1.378155	-0.338321	0.462388	0.239599	0.098
1	0.0	1.191857	0.266151	0.166480	0.448154	0.060018	-0.082361	-0.078803	0.085
2	1.0	-1.358354	-1.340163	1.773209	0.379780	-0.503198	1.800499	0.791461	0.247
3	1.0	-0.966272	-0.185226	1.792993	-0.863291	-0.010309	1.247203	0.237609	0.377
4	2.0	-1.158233	0.877737	1.548718	0.403034	-0.407193	0.095921	0.592941	-0.270

5 rows × 31 columns

```
df.describe()
```

	Time	V1	V2	V3	V4	
count	284807.000000	2.848070e+05	2.848070e+05	2.848070e+05	2.848070e+05	2.8480
mean	94813.859575	1.168375e-15	3.416908e-16	-1.379537e-15	2.074095e-15	9.604
std	47488.145955	1.958696e+00	1.651309e+00	1.516255e+00	1.415869e+00	1.3802
min	0.000000	-5.640751e+01	-7.271573e+01	-4.832559e+01	-5.683171e+00	-1.1374
25%	54201.500000	-9.203734e-01	-5.985499e-01	-8.903648e-01	-8.486401e-01	-6.915
50%	84692.000000	1.810880e-02	6.548556e-02	1.798463e-01	-1.984653e-02	-5.433
75%	139320.500000	1.315642e+00	8.037239e-01	1.027196e+00	7.433413e-01	6.119
max	172792.000000	2.454930e+00	2.205773e+01	9.382558e+00	1.687534e+01	3.4801

8 rows × 31 columns

```
print(df.describe(include='all'))
```

```
                Time            V1            V2            V3            V4  \
count  284807.000000  2.848070e+05  2.848070e+05  2.848070e+05  2.848070e+05
mean    94813.859575  1.168375e-15  3.416908e-16 -1.379537e-15  2.074095e-15
std     47488.145955  1.958696e+00  1.651309e+00  1.516255e+00  1.415869e+00
min         0.000000 -5.640751e+01 -7.271573e+01 -4.832559e+01 -5.683171e+00
25%     54201.500000 -9.203734e-01 -5.985499e-01 -8.903648e-01 -8.486401e-01
50%     84692.000000  1.810880e-02  6.548556e-02  1.798463e-01 -1.984653e-02
75%    139320.500000  1.315642e+00  8.037239e-01  1.027196e+00  7.433413e-01
max    172792.000000  2.454930e+00  2.205773e+01  9.382558e+00  1.687534e+01

                 V5            V6            V7            V8            V9  \
count  2.848070e+05  2.848070e+05  2.848070e+05  2.848070e+05  2.848070e+05
mean   9.604066e-16  1.487313e-15 -5.556467e-16  1.213481e-16 -2.406331e-15
std    1.380247e+00  1.332271e+00  1.237094e+00  1.194353e+00  1.098632e+00
min   -1.137433e+02 -2.616051e+01 -4.355724e+01 -7.321672e+01 -1.343407e+01
25%   -6.915971e-01 -7.682956e-01 -5.540759e-01 -2.086297e-01 -6.430976e-01
50%   -5.433583e-02 -2.741871e-01  4.010308e-02  2.235804e-02 -5.142873e-02
75%    6.119264e-01  3.985649e-01  5.704361e-01  3.273459e-01  5.971390e-01
max    3.480167e+01  7.330163e+01  1.205895e+02  2.000721e+01  1.559499e+01

       ...           V21           V22           V23           V24  \
count  ...  2.848070e+05  2.848070e+05  2.848070e+05  2.848070e+05
mean   ...  1.654067e-16 -3.568593e-16  2.578648e-16  4.473266e-15
std    ...  7.345240e-01  7.257016e-01  6.244603e-01  6.056471e-01
min    ... -3.483038e+01 -1.093314e+01 -4.480774e+01 -2.836627e+00
```

```
25%    ... -2.283949e-01 -5.423504e-01 -1.618463e-01 -3.545861e-01
50%    ... -2.945017e-02  6.781943e-03 -1.119293e-02  4.097606e-02
75%    ...  1.863772e-01  5.285536e-01  1.476421e-01  4.395266e-01
max    ...  2.720284e+01  1.050309e+01  2.252841e+01  4.584549e+00

                V25           V26           V27           V28         Amount  \
count  2.848070e+05  2.848070e+05  2.848070e+05  2.848070e+05  284807.000000
mean   5.340915e-16  1.683437e-15 -3.660091e-16 -1.227390e-16      88.349619
std    5.212781e-01  4.822270e-01  4.036325e-01  3.300833e-01     250.120109
min   -1.029540e+01 -2.604551e+00 -2.256568e+01 -1.543008e+01       0.000000
25%   -3.171451e-01 -3.269839e-01 -7.083953e-02 -5.295979e-02       5.600000
50%    1.659350e-02 -5.213911e-02  1.342146e-03  1.124383e-02      22.000000
75%    3.507156e-01  2.409522e-01  9.104512e-02  7.827995e-02      77.165000
max    7.519589e+00  3.517346e+00  3.161220e+01  3.384781e+01   25691.160000

              Class
count  284807.000000
mean        0.001727
std         0.041527
min         0.000000
25%         0.000000
50%         0.000000
75%         0.000000
max         1.000000

[8 rows x 31 columns]
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 284807 entries, 0 to 284806
Data columns (total 31 columns):
 #   Column  Non-Null Count   Dtype  
---  ------  --------------   -----  
 0   Time    284807 non-null  float64
 1   V1      284807 non-null  float64
 2   V2      284807 non-null  float64
 3   V3      284807 non-null  float64
 4   V4      284807 non-null  float64
 5   V5      284807 non-null  float64
 6   V6      284807 non-null  float64
 7   V7      284807 non-null  float64
 8   V8      284807 non-null  float64
 9   V9      284807 non-null  float64
 10  V10     284807 non-null  float64
 11  V11     284807 non-null  float64
 12  V12     284807 non-null  float64
 13  V13     284807 non-null  float64
 14  V14     284807 non-null  float64
 15  V15     284807 non-null  float64
 16  V16     284807 non-null  float64
 17  V17     284807 non-null  float64
 18  V18     284807 non-null  float64
 19  V19     284807 non-null  float64
 20  V20     284807 non-null  float64
 21  V21     284807 non-null  float64
 22  V22     284807 non-null  float64
 23  V23     284807 non-null  float64
 24  V24     284807 non-null  float64
 25  V25     284807 non-null  float64
 26  V26     284807 non-null  float64
 27  V27     284807 non-null  float64
 28  V28     284807 non-null  float64
 29  Amount  284807 non-null  float64
 30  Class   284807 non-null  int64  
dtypes: float64(30), int64(1)
memory usage: 67.4 MB
```

```
df.isna().sum()
```

```
Time      0
V1        0
V2        0
V3        0
V4        0
V5        0
V6        0
V7        0
V8        0
V9        0
V10       0
V11       0
V12       0
V13       0
V14       0
V15       0
V16       0
V17       0
```

```
V18       0
V19       0
V20       0
V21       0
V22       0
V23       0
V24       0
V25       0
V26       0
V27       0
V28       0
Amount    0
Class     0
dtype: int64
```

```
df.isna().sum() / len(df) * 100
```

```
Time      0.0
V1        0.0
V2        0.0
V3        0.0
V4        0.0
V5        0.0
V6        0.0
V7        0.0
V8        0.0
V9        0.0
V10       0.0
V11       0.0
V12       0.0
V13       0.0
V14       0.0
V15       0.0
V16       0.0
V17       0.0
V18       0.0
V19       0.0
V20       0.0
V21       0.0
V22       0.0
V23       0.0
V24       0.0
V25       0.0
V26       0.0
V27       0.0
V28       0.0
Amount    0.0
Class     0.0
dtype: float64
```

```
df.isna().sum() / len(df) * 100
```

```
Time      0.0
V1        0.0
V2        0.0
V3        0.0
V4        0.0
V5        0.0
V6        0.0
V7        0.0
V8        0.0
V9        0.0
V10       0.0
V11       0.0
V12       0.0
V13       0.0
V14       0.0
V15       0.0
V16       0.0
V17       0.0
V18       0.0
V19       0.0
V20       0.0
V21       0.0
V22       0.0
V23       0.0
V24       0.0
V25       0.0
V26       0.0
V27       0.0
V28       0.0
Amount    0.0
Class     0.0
dtype: float64
```

```
def return_frequency(column,df=df):
    print(f"The top 10 frequent in  {column} \n {df[column].value_counts().head(10)}")
```

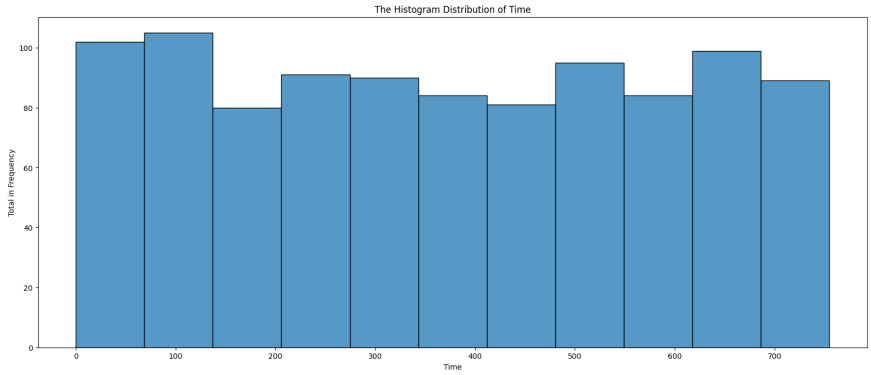
```
for column in df.columns:
    if column in ['Time','Amount','Class']:
        return_frequency(column)
    else :
        pass
```

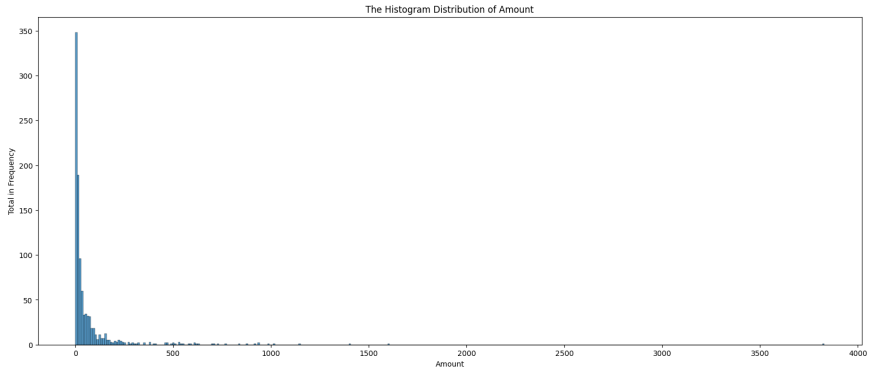
```
 The top 10 frequent in  Time
  163152.0    36
 64947.0     26
 68780.0     25
 3767.0      21
 3770.0      20
 3750.0      19
 19912.0     19
 140347.0    19
 128860.0    19
 143083.0    18
 Name: Time, dtype: int64
 The top 10 frequent in  Amount
  1.00     13688
 1.98      6044
 0.89      4872
 9.99      4747
 15.00     3280
 0.76      2998
 10.00     2950
 1.29      2892
 1.79      2623
 0.99      2304
 Name: Amount, dtype: int64
 The top 10 frequent in  Class
  0    284315
 1       492
 Name: Class, dtype: int64
```

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

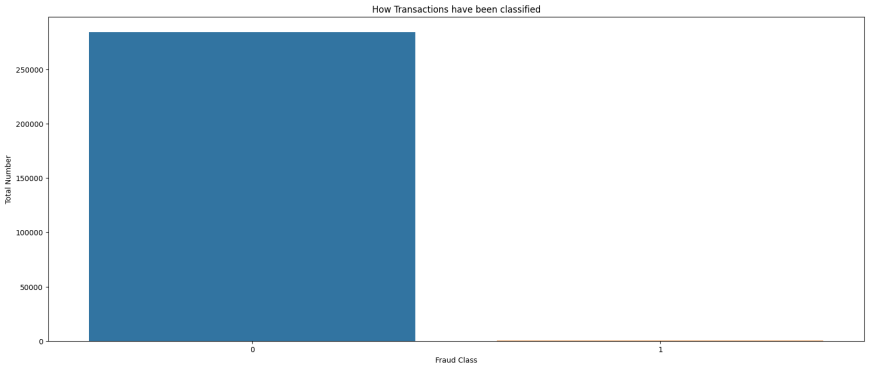
```
def draw_histogram(column,df=df.head(1000)):
    fig = plt.figure(figsize=(20,8))
    sns.histplot(x=column, data=df)
    plt.xlabel(column)
    plt.ylabel("Total in Frequency")
    plt.title(f"The Histogram Distribution of {column}")
    plt.show()
```

```
for column in df.columns:
    if column in ['Time','Amount']:
        draw_histogram(column)
    else :
        pass # You can add specific actions for other columns in the future if needed
```

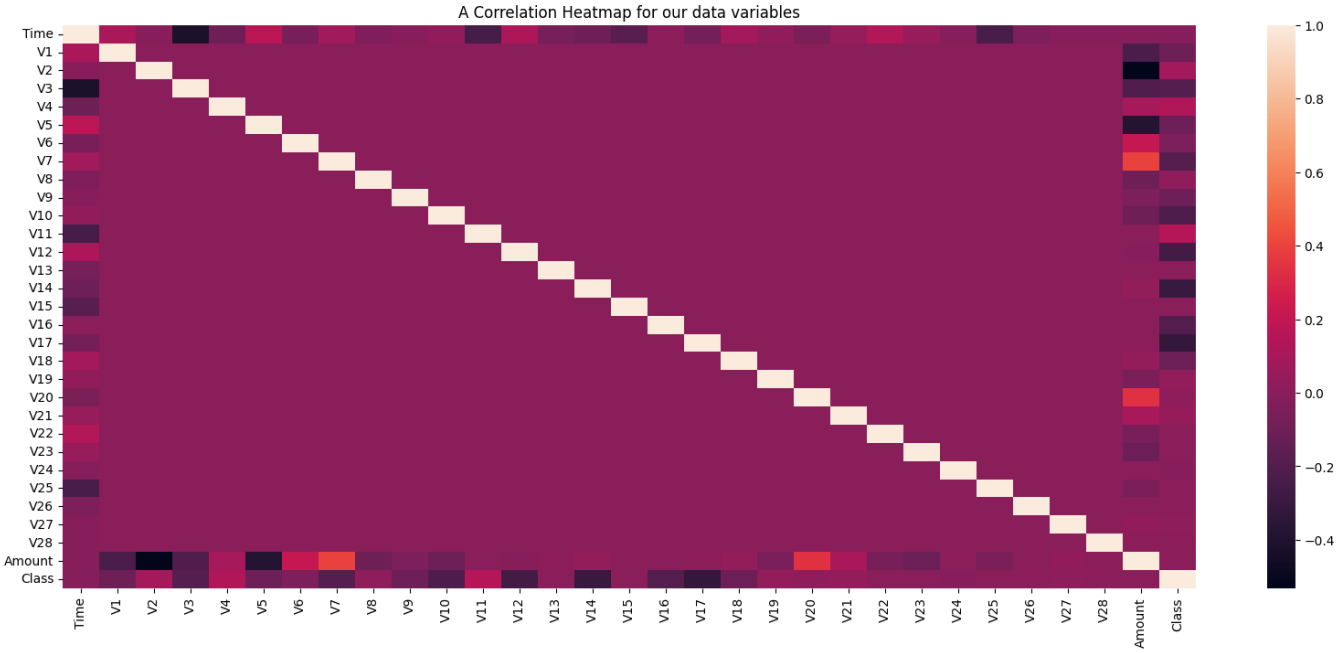





```
fig = plt.figure(figsize=(20,8))
sns.countplot(x='Class',data=df)
plt.xlabel('Fraud Class')
plt.ylabel("Total Number")
plt.title("How Transactions have been classified")
plt.show()
```

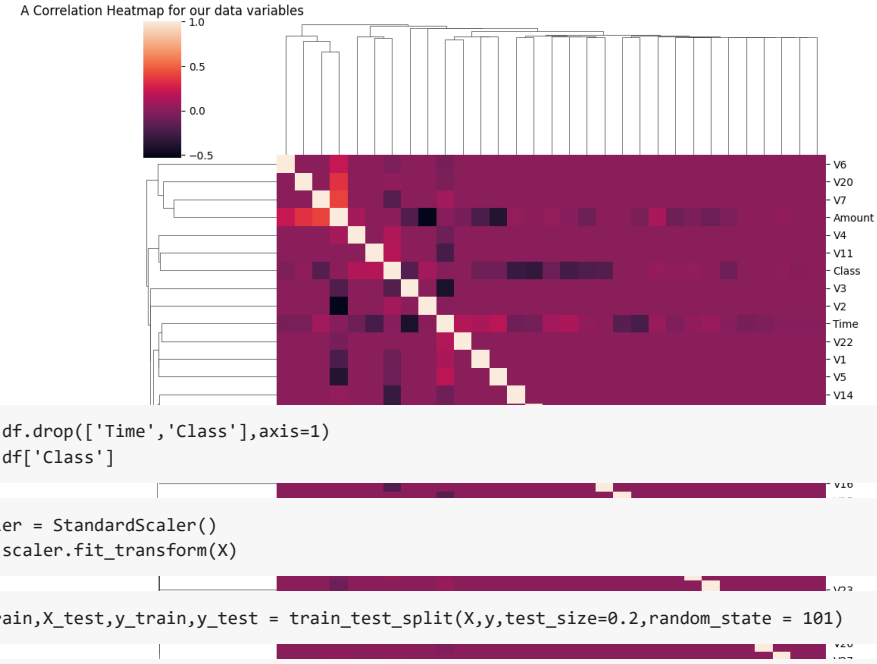



```
import seaborn as sns
import matplotlib.pyplot as plt

correlation = df.corr()

fig = plt.figure(figsize=(20,8))
sns.heatmap(correlation)
plt.title("A Correlation Heatmap for our data variables")
plt.show()
```




```
fig = plt.figure(figsize=(20,8))
sns.clustermap(correlation)
plt.title("A Correlation Heatmap for our data variables")
plt.show()
```

```
<Figure size 2000x800 with 0 Axes>
```




```
X = df.drop(['Time','Class'],axis=1)
y = df['Class']
```

```
scaler = StandardScaler()
X = scaler.fit_transform(X)
```

```
X_train,X_test,y_train,y_test = train_test_split(X,y,test_size=0.2,random_state = 101)
```

```
X_train.shape,y_train.shape
```

```
((227845, 29), (227845,))
```

```
rfc=RandomForestClassifier()
rfc.fit(X_train,y_train)
rf_predictions = rfc.predict(X_test)
print(f"The first 20 predictions are {rf_predictions[:20]}")
```

```
The first 20 predictions are [0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]
```

```
print(f"The Classification Report for my model is {classification_report(y_test,rf_predictions)}")
```

```
The Classification Report for my model is              precision    recall  f1-score   support

           0       1.00      1.00      1.00     56850
```