```
import numpy as np                          # linear algebra
import pandas as pd                         # data processing
import matplotlib.pyplot as plt             # visualization
import matplotlib.ticker as ticker          # visualization
import seaborn as sns                       # visualization
from sklearn import preprocessing
```

```
df = pd.read_csv("/kaggle/input/forex-daily-exchange-rates-10-years-v2/Forex_10Y.M1")
df.shape
# prints the number of df
df.columns.values
# prints for each df
df.dtypes
# prints the type of df
df.head(10)
```

```
(1048575, 31)
array(['Gmt time', 'EURUSD_Open', 'EURUSD_High', 'EURUSD_Low',
       'EURUSD_Close', 'EURUSD_Volume', 'GBPUSD_Open', 'GBPUSD_High',
       'GBPUSD_Low', 'GBPUSD_Close', 'GBPUSD_Volume', 'USDJPY_Open',
       'USDJPY_High', 'USDJPY_Low', 'USDJPY_Close', 'USDJPY_Volume',
       'USDCHF_Open', 'USDCHF_High', 'USDCHF_Low', 'USDCHF_Close',
       'USDCHF_Volume', 'USDCAD_Open', 'USDCAD_High', 'USDCAD_Low',
       'USDCAD_Close', 'USDCAD_Volume', 'AUDUSD_Open', 'AUDUSD_High',
       'AUDUSD_Low', 'AUDUSD_Close', 'AUDUSD_Volume'],
      dtype=object)
Gmt time                 object
EURUSD_Open             float64
EURUSD_High             float64
EURUSD_Low              float64
EURUSD_Close            float64
EURUSD_Volume           float64
GBPUSD_Open             float64
GBPUSD_High             float64
GBPUSD_Low              float64
GBPUSD_Close            float64
GBPUSD_Volume           float64
USDJPY_Open             float64
USDJPY_High             float64
USDJPY_Low              float64
USDJPY_Close            float64
USDJPY_Volume           float64
USDCHF_Open             float64
USDCHF_High             float64
USDCHF_Low              float64
USDCHF_Close            float64
USDCHF_Volume           float64
USDCAD_Open             float64
USDCAD_High             float64
USDCAD_Low              float64
USDCAD_Close            float64
USDCAD_Volume           float64
AUDUSD_Open             float64
AUDUSD_High             float64
AUDUSD_Low              float64
AUDUSD_Close            float64
AUDUSD_Volume           float64
dtype: object
```

	Gmt time	EURUSD_Open	EURUSD_High	EURUSD_Low	EURUSD_Close	EURUSD_Volume	GBPUSD_Open	GBPUSD_High	GBPUSD_Low	GBPUSD_Close	GBPUSD_Volume	USDJPY_Open	USDJPY_High	USDJPY_Low	USDJPY_Close	USDJPY_Volume	USDCHF_Open	USDCHF_High	USDCHF_Low	USDCHF_Close	USDCHF_Volume	USDCAD_Open	USDCAD_High	USDCAD_Low	USDCAD_Close	USDCAD_Volume	AUDUSD_Open	AUDUSD_High	AUDUSD_Low	AUDUSD_Close	AUDUSD_Volume
0	2009.08.31 00:00:00	1.4467	1.4467	1.4467	1.4467	0.000000	1.6198	1.6198	1.6198	1.6198	0.000000	90.000	90.000	90.000	90.000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	0.8900	0.8900	0.8900	0.8900	0.000000
1	2009.09.01 00:00:00	1.4467	1.4467	1.4467	1.4467	0.000000	1.6198	1.6198	1.6198	1.6198	0.000000	90.000	90.000	90.000	90.000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	0.8900	0.8900	0.8900	0.8900	0.000000
2	2009.09.02 00:00:00	1.4467	1.4467	1.4467	1.4467	0.000000	1.6198	1.6198	1.6198	1.6198	0.000000	90.000	90.000	90.000	90.000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	0.8900	0.8900	0.8900	0.8900	0.000000
3	2009.09.03 00:00:00	1.4467	1.4467	1.4467	1.4467	0.000000	1.6198	1.6198	1.6198	1.6198	0.000000	90.000	90.000	90.000	90.000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	0.8900	0.8900	0.8900	0.8900	0.000000
4	2009.09.04 00:00:00	1.4467	1.4467	1.4467	1.4467	0.000000	1.6198	1.6198	1.6198	1.6198	0.000000	90.000	90.000	90.000	90.000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	0.8900	0.8900	0.8900	0.8900	0.000000
5	2009.09.07 00:00:00	1.4467	1.4467	1.4467	1.4467	0.000000	1.6198	1.6198	1.6198	1.6198	0.000000	90.000	90.000	90.000	90.000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	0.8900	0.8900	0.8900	0.8900	0.000000
6	2009.09.08 00:00:00	1.4467	1.4467	1.4467	1.4467	0.000000	1.6198	1.6198	1.6198	1.6198	0.000000	90.000	90.000	90.000	90.000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	0.8900	0.8900	0.8900	0.8900	0.000000
7	2009.09.09 00:00:00	1.4467	1.4467	1.4467	1.4467	0.000000	1.6198	1.6198	1.6198	1.6198	0.000000	90.000	90.000	90.000	90.000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	0.8900	0.8900	0.8900	0.8900	0.000000
8	2009.09.10 00:00:00	1.4467	1.4467	1.4467	1.4467	0.000000	1.6198	1.6198	1.6198	1.6198	0.000000	90.000	90.000	90.000	90.000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	0.8900	0.8900	0.8900	0.8900	0.000000
9	2009.09.11 00:00:00	1.4467	1.4467	1.4467	1.4467	0.000000	1.6198	1.6198	1.6198	1.6198	0.000000	90.000	90.000	90.000	90.000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	1.0000	1.0000	1.0000	1.0000	0.000000	0.8900	0.8900	0.8900	0.8900	0.000000

```
df.info()
df.describe()
df.isnull().sum()
# prints info about the dataset
# prints the number of null values in each column
df.corr()
# prints correlation matrix
df.sample(10)
# prints 10 random rows
df.tail(10)
# prints last 10 rows
```

```
<class'pandas.core.frame.DataFrame'>
RangeIndex:1048575 entries,0 to 1048574
Data columns(total 31 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Gmt time        1048575 non-null  object
 1   EURUSD_Open     1048575 non-null  float64
 2   EURUSD_High     1048575 non-null  float64
 3   EURUSD_Low      1048575 non-null  float64
 4   EURUSD_Close    1048575 non-null  float64
 5   EURUSD_Volume   1048575 non-null  float64
 6   GBPUSD_Open     1048575 non-null  float64
 7   GBPUSD_High     1048575 non-null  float64
 8   GBPUSD_Low      1048575 non-null  float64
 9   GBPUSD_Close    1048575 non-null  float64
 10  GBPUSD_Volume   1048575 non-null  float64
 11  USDJPY_Open     1048575 non-null  float64
 12  USDJPY_High     1048575 non-null  float64
 13  USDJPY_Low      1048575 non-null  float64
 14  USDJPY_Close    1048575 non-null  float64
 15  USDJPY_Volume   1048575 non-null  float64
 16  USDCHF_Open     1048575 non-null  float64
 17  USDCHF_High     1048575 non-null  float64
 18  USDCHF_Low      1048575 non-null  float64
 19  USDCHF_Close    1048575 non-null  float64
 20  USDCHF_Volume   1048575 non-null  float64
 21  USDCAD_Open     1048575 non-null  float64
 22  USDCAD_High     1048575 non-null  float64
 23  USDCAD_Low      1048575 non-null  float64
 24  USDCAD_Close    1048575 non-null  float64
 25  USDCAD_Volume   1048575 non-null  float64
 26  AUDUSD_Open     1048575 non-null  float64
 27  AUDUSD_High     1048575 non-null  float64
 28  AUDUSD_Low      1048575 non-null  float64
 29  AUDUSD_Close    1048575 non-null  float64
 30  AUDUSD_Volume   1048575 non-null  float64
dtype:float64,object)memory usage:247.9+MB
```

	EURUSD_Open	EURUSD_High	EURUSD_Low	EURUSD_Close	EURUSD_Volume	GBPUSD_Open	GBPUSD_High	GBPUSD_Low	GBPUSD_Close	GBPUSD_Volume	USDJPY_Open	USDJPY_High	USDJPY_Low	USDJPY_Close	USDJPY_Volume	USDCHF_Open	USDCHF_High	USDCHF_Low	USDCHF_Close	USDCHF_Volume	USDCAD_Open	USDCAD_High	USDCAD_Low	USDCAD_Close	USDCAD_Volume	AUDUSD_Open	AUDUSD_High	AUDUSD_Low	AUDUSD_Close	AUDUSD_Volume
count	1.048575e+06	1.048575e+06	1.048575e+06

0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
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8.25
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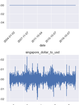
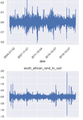
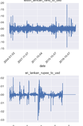
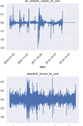
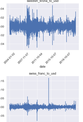
8.75
9.00
9.25
9.50
9.75
10.00

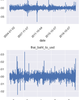












Now let's get the correlation matrix for the daily returns of the currencies exchange rates

```
# Compute the correlation matrix
corr_df_returns.corr()

# Generate a mask for the upper triangle
mask = np.zeros_like(corr_df_returns, dtype=bool)
mask[np.triu_indices_from(mask)] = True

# Set up the matplotlib figure
f, ax = plt.subplots(figsize=(11, 9))

# Generate a custom diverging colormap
cmap = sns.diverging_palette(220, 10, as_cmap=True)

# Draw the heatmap with the mask and correct aspect ratio
sns.set(font_scale=0.8)
sns.heatmap(corr_df_returns, mask=mask, cmap=cmap, center=0, linewidths=.5,
            square=True, cbar_kws={"shrink": .5, "aux_axes":[axis0, .5]})
```

```
C:\Users\Fred\Applications\Anaconda\Lib\site-packages\_sklearn_0.19dev-py3.5-win-amd64.egg\sklearn\utils\deprecation.pyc:70: DeprecationWarning: 'np.bool' is a deprecated alias for the builtin 'bool'. To silence this warning, use 'bool' by itself. Doing this will not modify any behavior and is safe. If you do depend on the builtin type, use instead in your code.
  warnings.warn("Deprecation warning: np.bool is a deprecated alias for np.bool_. This will raise an error in numpy 1.20. To avoid this warning, use `bool` by itself. Doing this will not modify any behavior and is safe. If you do depend on the builtin type, use instead in your code.", DeprecationWarning, stacklevel=2)
C:\Users\Fred\Applications\Anaconda\Lib\site-packages\_sklearn_0.19dev-py3.5-win-amd64.egg\sklearn\utils\deprecation.pyc:70: DeprecationWarning: 'np.int' is a deprecated alias for the builtin 'int'. To silence this warning, use 'int' by itself. Doing this will not modify any behavior and is safe. If you do depend on the builtin type, use instead in your code.
  warnings.warn("Deprecation warning: np.int is a deprecated alias for np.int_. This will raise an error in numpy 1.20. To avoid this warning, use `int` by itself. Doing this will not modify any behavior and is safe. If you do depend on the builtin type, use instead in your code.", DeprecationWarning, stacklevel=2)
```

ahmedi_dram_to_usd
algerian_dinar_to_usd
angolan_kwanza_to_usd
australian_dollar_to_usd
bahrain_dinar_to_usd
brunei_dollar_to_usd
canadian_dollar_to_usd
cayman_dollars_to_usd
czech_koruna_to_usd
danish_krone_to_usd
dominican_peso_to_usd
fijian_dollar_to_usd
hungarian_forint_to_usd
indian_rupee_to_usd
indonesian_rupiah_to_usd
iranian_rial_to_usd
israeli_shekel_to_usd
jamaican_dollar_to_usd
japanese_yen_to_usd
kenyan_shilling_to_usd
kuwaiti_dinar_to_usd
lebanese_pound_to_usd
malaysian_ringgit_to_usd
mauritius_rupee_to_usd
mexican_peso_to_usd
nepalese_rupee_to_usd
new_zealand_dollar_to_usd
norwegian_krone_to_usd
omani_rial_to_usd
pakistani_rupee_to_usd
panamian_balb_to_usd
philippine_peso_to_usd
polish_zloty_to_usd
qatari_riyal_to_usd
romanian_leu_to_usd
saudi_arabian_riyal_to_usd
singapore_dollar_to_usd
south_african_rand_to_usd
sri_lankan_rupee_to_usd
swedish_krona_to_usd
swiss_franc_to_usd
thai_baht_to_usd
trinidadian_dollar_to_usd
tunisian_dinar_to_usd
uae_dirham_to_usd
uruguayan_peso_to_usd
bolivar_fuerte_to_usd
1.000
0.000
-0.000
-0.000
-