1. Impoting Dependencies :

C-Number of row & columns:

In [ ]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn import svm
from sklearn.preprocessing import StandardScaler
from sklearn.ensemble import RandomForestRegressor
from sklearn import metrics
```

2. Data Collcetion and Analysis:

A- Loading dataset :

In [ ]:
```
data_gold = pd.read_csv("C:/Machine_learning Python/projets/GoldPrice/gld_price_
```

B- View the data (head)

In [ ]:
```
data_gold.head()
```

Out[ ]:

	Date	SPX	GLD	USO	SLV	EUR/USD
0	1/2/2008	1447.160034	84.860001	78.470001	15.180	1.471692
1	1/3/2008	1447.160034	85.570000	78.370003	15.285	1.474491
2	1/4/2008	1411.630005	85.129997	77.309998	15.167	1.475492
3	1/7/2008	1416.180054	84.769997	75.500000	15.053	1.468299
4	1/8/2008	1390.189941	86.779999	76.059998	15.590	1.557099

C- View the last 5 row of the data:

In [ ]:
```
data_gold.tail()
```

Out[ ]:

	Date	SPX	GLD	USO	SLV	EUR/USD
2285	5/8/2018	2671.919922	124.589996	14.0600	15.5100	1.186789
2286	5/9/2018	2697.790039	124.330002	14.3700	15.5300	1.184722
2287	5/10/2018	2723.070068	125.180000	14.4100	15.7400	1.191753
2288	5/14/2018	2730.129883	124.489998	14.3800	15.5600	1.193118
2289	5/16/2018	2725.780029	122.543800	14.4058	15.4542	1.182033

D- type of the data (head)

In [ ]:
```
type(data_gold)
```

Out[ ]:
```
pandas.core.frame.DataFrame
```

E-Number of row & columns:

In [ ]:
```
data_gold.shape
```

Out[ ]:
```
(2290, 6)
```

F- Information about the data:

In [ ]:
```
data_gold.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2290 entries, 0 to 2289
Data columns (total 6 columns):
 #   Column   Non-Null Count  Dtype  
---  ------   --------------  -----  
 0   Date     2290 non-null   object 
 1   SPX      2290 non-null   float64
 2   GLD      2290 non-null   float64
 3   USO      2290 non-null   float64
 4   SLV      2290 non-null   float64
 5   EUR/USD  2290 non-null   float64
dtypes: float64(5), object(1)
memory usage: 107.5+ KB
```

2. Statisctical measures :

A- General Statistic:

In [ ]:
```
data_gold.describe()
```

Out[ ]:

	SPX	GLD	USO	SLV	EUR/USD
count	2290.000000	2290.000000	2290.000000	2290.000000	2290.000000
mean	1654.315776	122.732875	31.842221	20.084997	1.283653
std	519.111540	23.283346	19.523517	7.092566	0.131547
min	676.530029	70.000000	7.960000	8.850000	1.039047
25%	1239.874969	109.725000	14.380000	15.570000	1.171313
50%	1551.434998	120.580002	33.869999	17.268500	1.303297
75%	2073.010070	132.840004	37.827501	22.882500	1.369971
max	2872.870117	184.589996	117.480003	47.259998	1.598798

B- Number of missing value in each column;

In [ ]:
```
data_gold.isnull().sum()
#Any missing values
```

Out[ ]:
```
Date       0
SPX        0
GLD        0
USO        0
SLV        0
EUR/USD    0
dtype: int64
```

3. Correlation:

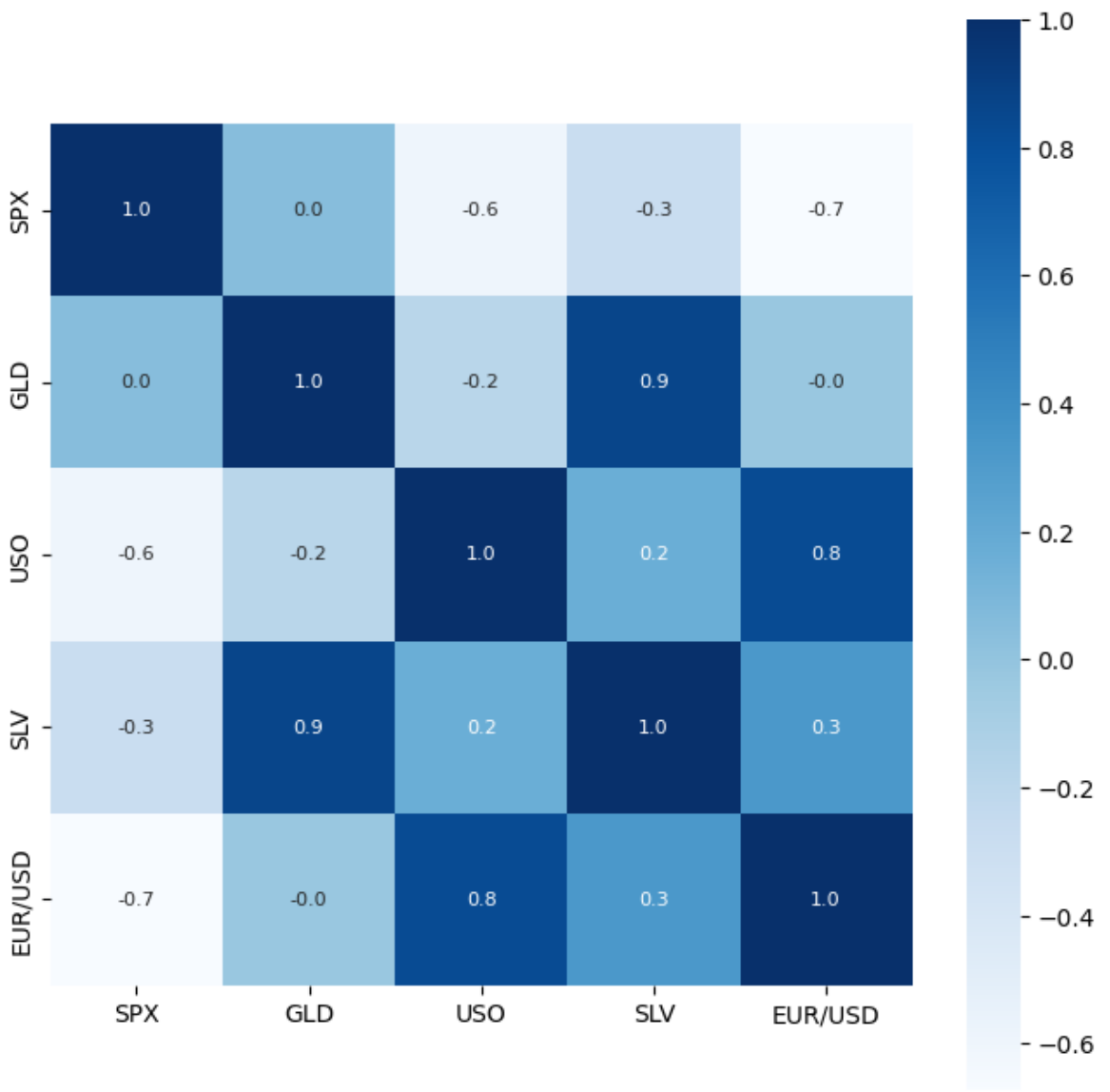
A- Positive correlation:

In [ ]:
```
data_goldCorr = data_gold.iloc[:,1:]
correlation = data_goldCorr.corr()
```

B- Contruction of the heatmap

In [ ]:
```
plt.figure(figsize= (8,8) )
sns.heatmap(correlation, cbar=True, square=True, fmt = ".1f", annot=True, annot_
```

Out[ ]: <Axes: >



B- Correlation value of GLD:

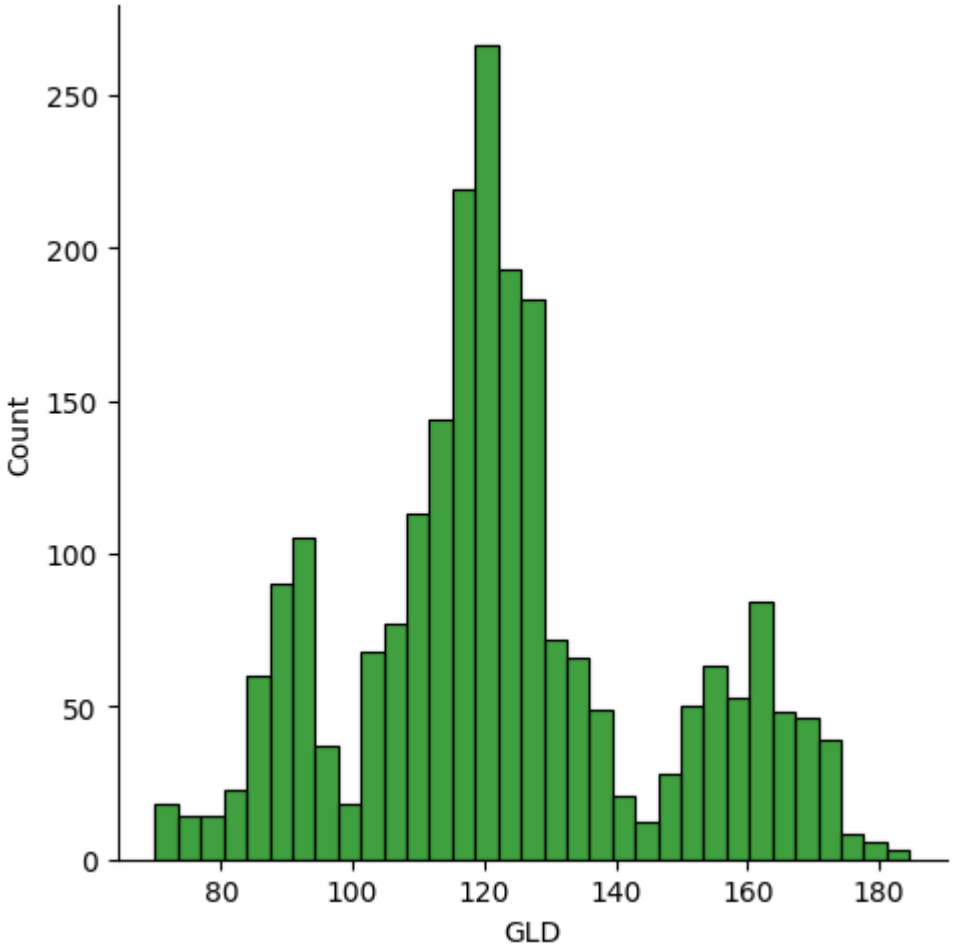
In [ ]:
```
print(correlation['GLD'])
```

```
SPX        0.049345
GLD        1.000000
USO       -0.186360
SLV        0.866632
EUR/USD   -0.024375
Name: GLD, dtype: float64
```

C- Cheking the distribution of the GOLDQ PRICE:

In [ ]:
```
sns.displot(data_gold['GLD'], color='green')
```

Out[ ]:
```
<seaborn.axisgrid.FacetGrid at 0x2226208cd40>
```



5. Train test split:

A- Separating a data & label

In [ ]:
```
X = data_gold.drop(['Date', 'GLD'], axis=1)
Y = data_gold["GLD"]
print(X)
print(Y)
```

```
                SPX         USO       SLV   EUR/USD
0      1447.160034   78.470001  15.1800  1.471692
1      1447.160034   78.370003  15.2850  1.474491
2      1411.630005   77.309998  15.1670  1.475492
3      1416.180054   75.500000  15.0530  1.468299
4      1390.189941   76.059998  15.5900  1.557099
...            ...         ...      ...       ...
2285   2671.919922   14.060000  15.5100  1.186789
2286   2697.790039   14.370000  15.5300  1.184722
2287   2723.070068   14.410000  15.7400  1.191753
2288   2730.129883   14.380000  15.5600  1.193118
2289   2725.780029   14.405800  15.4542  1.182033

[2290 rows x 4 columns]
0         84.860001
1         85.570000
2         85.129997
3         84.769997
4         86.779999
            ...
2285     124.589996
2286     124.330002
2287     125.180000
2288     124.489998
2289     122.543800
Name: GLD, Length: 2290, dtype: float64
```

B- Test Split

In [ ]:
```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size = 0.2, randc
```

In [ ]:
```
print(X.shape,X_train.shape, X_test.shape)
```

```
(2290, 4) (1832, 4) (458, 4)
```

6. Training the model (Randon Forest Regression):

A- Loading the model

In [ ]:
```
model = RandomForestRegressor()
```

B- Training the model:

In [ ]:
```
model.fit(X_train, Y_train)
```

Out[ ]:
```
▾ RandomForestRegressor
RandomForestRegressor()
```

7. Model Evaluation:

A- Prediction of test data:

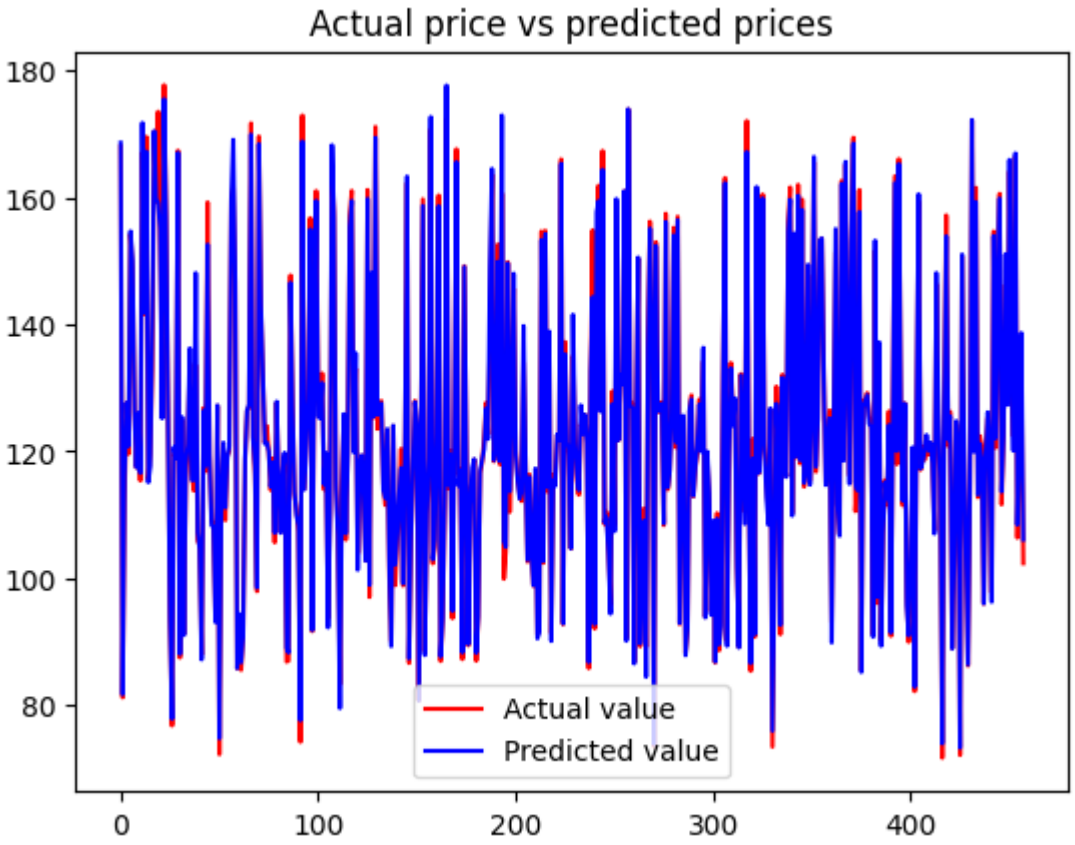
In [ ]:
```
test_train_prediction = model.predict(X_test)
error_score = metrics.r2_score(Y_test, test_train_prediction)
```

```
print("R squared Error : ", error_score)
```

```
R squared Error :  0.9894278870106328
```

B- Compare the actual valuead and Predicted value:

In [ ]:
```
Y_test = list(Y_test)
plt.plot(Y_test, color = 'red', label ='Actual value')
plt.plot(test_train_prediction, color = 'blue', label ='Predicted value')
plt.title("Actual price vs predicted prices")
plt.legend()
plt.show()
```



8- Example:

In [ ]:
```
def  predictionF(SPX,USO,SLV,EUR_USD):
    input_data = (SPX,USO,SLV,EUR_USD)
    #Input the data into the numpy array:
    input_dataNumpuy = np.asarray(input_data)
    #Reshape the data:
    input_dataReshaped = input_dataNumpuy.reshape(1,-1)
    #Predict the model:
    prediction = model.predict(input_dataReshaped)
    print("The predcition price of the gold is:", prediction[0])

predictionF(1400.160034,90.470001,13.18,1.471692)
```

```
The predcition price of the gold is: 82.44929941000002
```

```
c:\Users\HP\AppData\Local\Programs\Python\Python312\Lib\site-packages\sklearn\bas
e.py:465: UserWarning: X does not have valid feature names, but RandomForestRegre
ssor was fitted with feature names
  warnings.warn(
```