```
# Importing the libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

```
dataset = pd.read_csv('Concrete_Data_Yeh.csv')
X = dataset.iloc[:,:-1].values
y = dataset.iloc[:,-1].values
```

```
dataset.columns
```

```
Index(['cement', 'slag', 'flyash', 'water', 'superplasticizer',
       'coarseaggregate', 'fineaggregate', 'age', 'csMPa'],
      dtype='object')
```

```
dataset.describe()
```

	cement	slag	flyash	water	superplasticizer	coarseaggregate	fineaggr
count	1030.000000	1030.000000	1030.000000	1030.000000	1030.000000	1030.000000	1030.0
mean	281.167864	73.895825	54.188350	181.567282	6.204660	972.918932	773.5
std	104.506364	86.279342	63.997004	21.354219	5.973841	77.753954	80.1
min	102.000000	0.000000	0.000000	121.800000	0.000000	801.000000	594.0
25%	192.375000	0.000000	0.000000	164.900000	0.000000	932.000000	730.9
50%	272.900000	22.000000	0.000000	185.000000	6.400000	968.000000	779.5
			118.300000	192.000000	10.200000	1029.400000	824.0
			200.100000	247.000000	32.200000	1145.000000	992.6

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```
# Check for missing values and replace with mean value
from sklearn.impute import SimpleImputer
imputer = SimpleImputer(missing_values=np.nan, strategy ='mean')
imputer.fit(X)
X = imputer.transform(X)
```

```
# Train Test Split
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X,y, test_size = 0.2, random_state =101)
```

```
X_train[:5,:]
```

```
array([[144.8,   0. , 133.6, 180.8,  11.1, 979.5, 811.5,  28. ],
       [425. , 106.3,   0. , 151.4,  18.6, 936. , 803.7,  56. ],
       [287.3, 120.5,  93.9, 187.6,   9.2, 904.4, 695.9,  28. ],
       [333. ,   0. ,   0. , 192. ,   0. , 931.2, 842.6,   7. ],
       [290.4,   0. ,  96.2, 168.1,   9.4, 961.2, 865. ,   3. ]])
```

```
y_train[:5]
```

```
array([13.2, 64.9, 43.8, 23.4, 22.5])
```

```
# Fitting the regression model
from sklearn.linear_model import LinearRegression
```

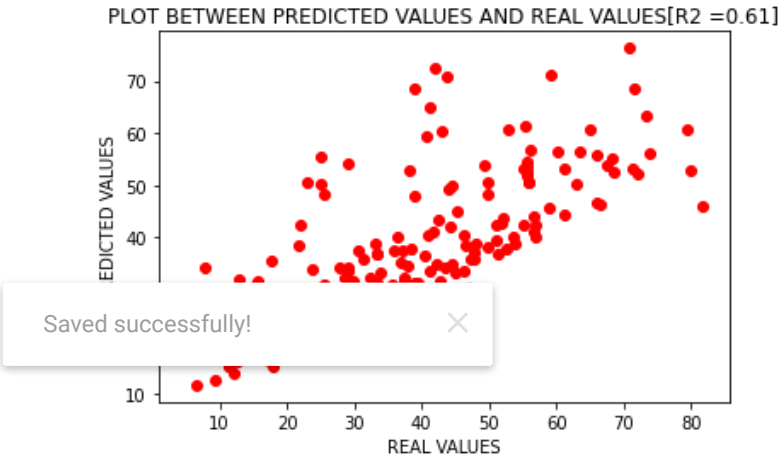
```
regressor = LinearRegression()
regressor.fit(X_train, y_train)
```

```
# Predicting the outcomes
y_pred = regressor.predict(X_test)
```

```
# Checking R2 score of the model
from sklearn.metrics import r2_score
r_sq = r2_score(y_test, y_pred)
r_sq = round(r_sq,2)
r_sq
```

```
0.61
```

```
# Visualisation part
plt.title(f'PLOT BETWEEN PREDICTED VALUES AND REAL VALUES[R2 ={r_sq}]')
plt.scatter(y_test, y_pred , c='red')
plt.xlabel('REAL VALUES')
plt.ylabel('PREDICTED VALUES')
plt.show()
```



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```
# Regression coefficients
print(regressor.coef_)
print(regressor.intercept_)
```

```
[ 0.1124933   0.09539303  0.08097259 -0.16339456  0.28143077  0.00918951
  0.01265157  0.12003711]
-3.5396038411043733
```

```
for i in range(len(regressor.coef_)):
  print(f'{dataset.columns[i]} : {regressor.coef_[i]}')
```

```
cement : 0.11249330457885091
slag : 0.09539302750839922
flyash : 0.0809725912343583
water : -0.16339456250224388
superplasticizer : 0.281430766630893
coarseaggregate : 0.009189507092264192
fineaggregate : 0.012651574933176118
age : 0.1200371088972308
```

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