

```
from google.colab import files
upload=files.upload()

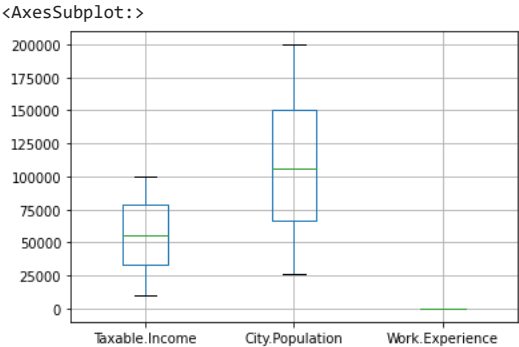
Choose Files  Fraud_check.csv
• Fraud_check.csv(text/csv) - 21837 bytes, last modified: 2/25/2023 - 100% done
Saving Fraud_check.csv to Fraud_check.csv
```

```
import pandas as pd
import numpy as np
```

```
df=pd.read_csv("Fraud_check.csv")
df.head()
```

	Undergrad	Marital.Status	Taxable.Income	City.Population	Work.Experience	Ur
0	NO	Single	68833	50047	10	\
1	YES	Divorced	33700	134075	18	\
2	NO	Married	36925	160205	30	\
3	YES	Single	50190	193264	15	\
4	NO	Married	81002	27533	28	\

```
df.shape
df.dtypes
df.isnull().sum()
df.boxplot(None)
```



```
df_cat=df.select_dtypes("object")
df_con=df.select_dtypes("int")
df_cat
```

	Undergrad	Marital.Status	Urban	
0	NO	Single	YES	
1	YES	Divorced	YES	
2	NO	Married	YES	
3	YES	Single	YES	
4	NO	Married	NO	
...	
595	YES	Divorced	YES	
596	YES	Divorced	YES	
597	NO	Divorced	YES	
598	YES	Married	NO	
599	NO	Divorced	NO	

600 rows × 3 columns

```

from sklearn.preprocessing import LabelEncoder
LE=LabelEncoder()
for i in range(0,3):
    df_cat.iloc[:,i]=LE.fit_transform(df_cat.iloc[:,i])

/usr/local/lib/python3.8/dist-packages/pandas/core/indexing.py:1951: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user\_guide/indexing.html#returning-a-view-versus-a-copy
    self.obj[selected_item_labels] = value
/usr/local/lib/python3.8/dist-packages/pandas/core/indexing.py:1773: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user\_guide/indexing.html#returning-a-view-versus-a-copy
    self._setitem_single_column(ilocs[0], value, pi)

```

```

from sklearn.preprocessing import StandardScaler
SS=StandardScaler()
df_con_SS=SS.fit_transform(df_con)
df_con_SS=pd.DataFrame(df_con_SS)

df1=pd.concat([df_con_SS,df_cat],axis=1)

x=df1.iloc[:,0:5]
y=df1["Urban"]

from sklearn.model_selection import train_test_split
X_train,X_test,Y_train,Y_test=train_test_split(x,y,test_size=0.3)

```

```

from sklearn.ensemble import RandomForestRegressor
RFC = RandomForestRegressor(max_depth=0.5,max_features=0.6)
RFC.fit(X_train,Y_train)
Y_pred_train=RFC.predict(X_train)
Y_pred_test=RFC.predict(X_test)
from sklearn.metrics import mean_squared_error
mse1 = mean_squared_error(Y_train,Y_pred_train)
RMSE1 = np.sqrt(mse1)
print("Training Error: ",RMSE1.round(2))

mse2 = mean_squared_error(Y_test,Y_pred_test)
RMSE2 = np.sqrt(mse2)
print("Test Error: ",RMSE2.round(2))

Training Error:  0.5
Test Error:  0.5
/usr/local/lib/python3.8/dist-packages/sklearn/utils/validation.py:1688: FutureWarning: Feature names only support names that are all st
warnings.warn(
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##### 33 k_fold #####
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```

from sklearn.model_selection import KFold
from sklearn.model_selection import cross_val_score
from sklearn.metrics import mean_squared_error

kfold = KFold(n_splits=8)

results = abs(cross_val_score(RFC, x, y, cv=kfold, scoring='neg_mean_squared_error'))
results
n=np.sqrt(np.mean(results))
n

##### 3 K_Fold mse = 0.5

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0.5012791722896819

```

333 bagging #####3

```

from sklearn.ensemble import BaggingRegressor
BG=BaggingRegressor(max_features=0.5)
BG.fit(X_train,Y_train)
Y_pred_train=BG.predict(X_train)
Y_pred_test=BG.predict(X_test)
from sklearn.metrics import mean_squared_error
mse1 = mean_squared_error(Y_train,Y_pred_train)
RMSE1 = np.sqrt(mse1)
print("Training Error: ",RMSE1.round(2))

mse2 = mean_squared_error(Y_test,Y_pred_test)
RMSE2 = np.sqrt(mse2)
print("Test Error: ",RMSE2.round(2))

```

Training Error: 0.28

Test Error: 0.53

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