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Roll- 92

Pattern Anomaly and Detection

PCA

CODE LINK => https://github.com/ishikkkkaaaa/UPES/blob/master/Pattern-and-Anomoly-Detection/LAB6%20PCA/main.ipynb

Importing libraries

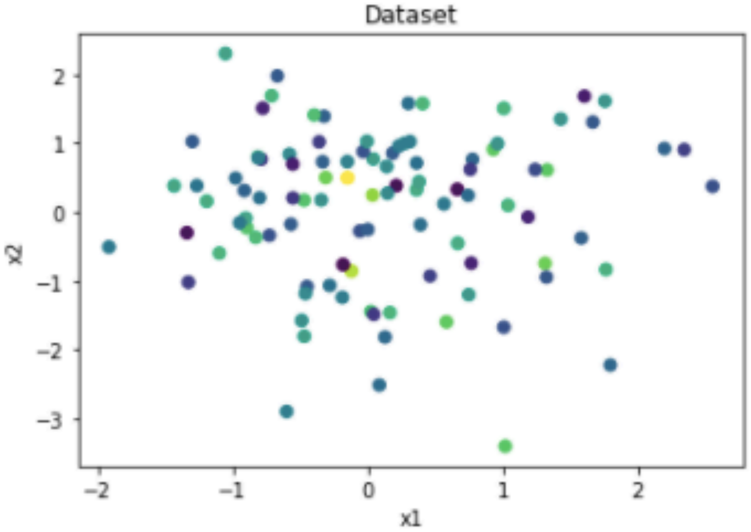
```
In [27]: import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         import seaborn as sns
         %matplotlib inline
```

Make Regression

```
In [28]: from sklearn.datasets import make_regression
         x,y = make_regression(n_samples=100, n_informative=4, noise=5)
```

```
In [29]: #visualizing dataset
         plt.scatter(x[:,0],x[:,1],c=y)
         plt.xlabel('x1')
         plt.ylabel('x2')
         plt.title('Dataset')

Out[29]: Text(0.5, 1.0, 'Dataset')
```



PCA VISUALIZATION

it is difficult to visualize high dimensional data, we can use PCA to find the first two principal components, and visualize the data in this new, two-dimensional space, with a single scatter-plot. Before we do this though, we'll need to scale our data so that each feature has a single unit variance.

In [30]:

```
from sklearn.preprocessing import StandardScaler
```

Now we scale our data,so that each feature has a single unit variance

In [31]:

```
scalar=StandardScaler()
scalar.fit(x)
```

Out[31]:

```
StandardScaler()
```

In [32]:

```
scaled_data=scalar.transform(x)
```

now what we're gonna do is instantiate a PC object, find the principal component using fit() method and then apply the rotation in dimensionality redunction like calling transform()

In [33]:

```
#family PCA is under decomposition (essentially we are decomposing this into principal componenets)
from sklearn.decomposition import PCA
```

In [34]:

```
pca= PCA(n_components=2)
pca.fit(scaled_data)
```

Out[34]:

```
PCA(n_components=2)
```

In [35]:

```
#now transform to its first principal components
x_pca=pca.transform(scaled_data)
```

In [36]:

```
scaled_data.shape
```

Out[36]:

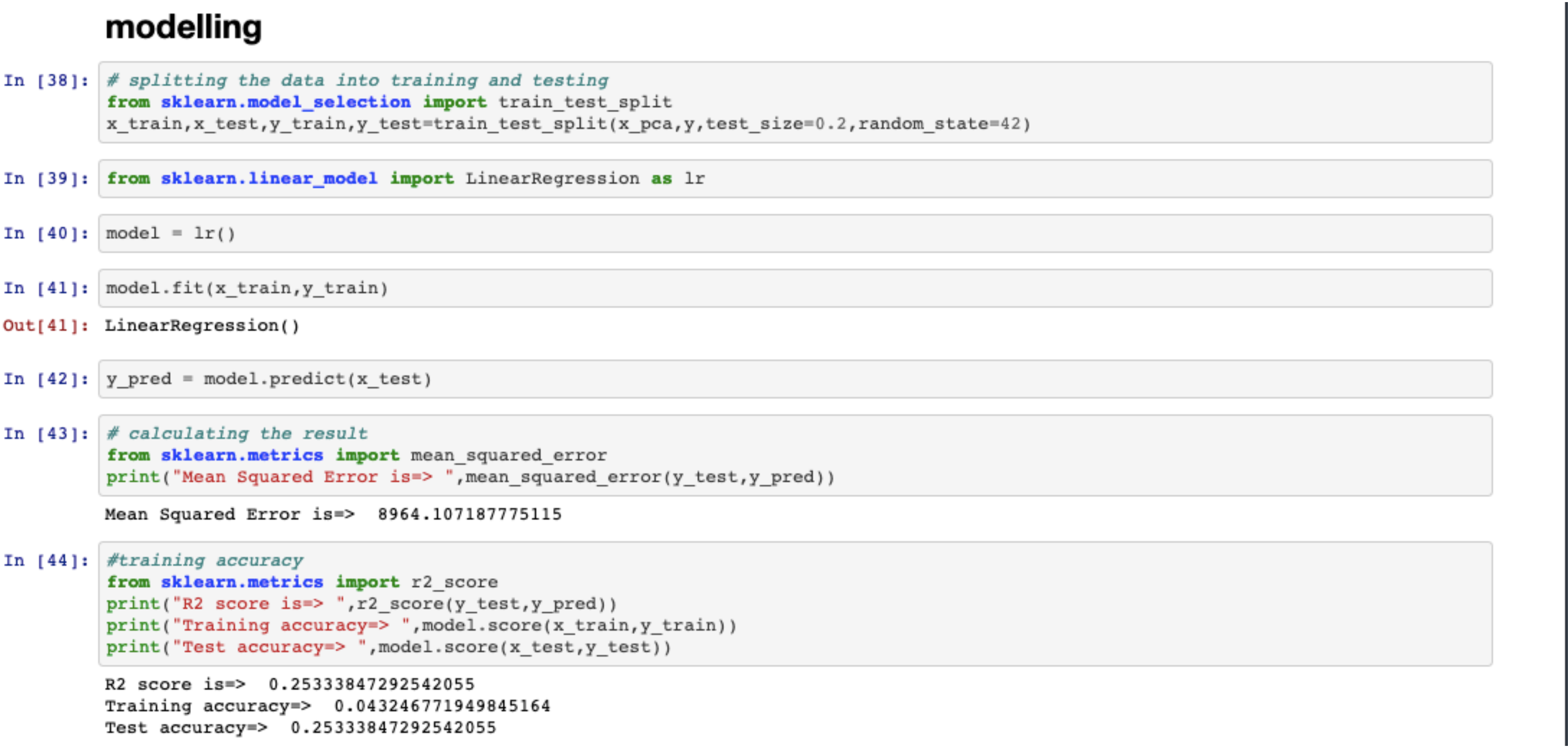
```
(100, 100)
```

In [37]:

```
x_pca.shape
```

Out[37]:

```
(100, 2)
```



modelling

```
In [38]: # splitting the data into training and testing
         from sklearn.model_selection import train_test_split
         x_train,x_test,y_train,y_test=train_test_split(x_pca,y,test_size=0.2,random_state=42)
```

```
In [39]: from sklearn.linear_model import LinearRegression as lr
```

```
In [40]: model = lr()
```

```
In [41]: model.fit(x_train,y_train)

Out[41]: LinearRegression()
```

```
In [42]: y_pred = model.predict(x_test)
```

```
In [43]: # calculating the result
         from sklearn.metrics import mean_squared_error
         print("Mean Squared Error is=> ",mean_squared_error(y_test,y_pred))

         Mean Squared Error is=>  8964.107187775115
```

```
In [44]: #training accuracy
         from sklearn.metrics import r2_score
         print("R2 score is=> ",r2_score(y_test,y_pred))
         print("Training accuracy=> ",model.score(x_train,y_train))
         print("Test accuracy=> ",model.score(x_test,y_test))

         R2 score is=>  0.25333847292542055
         Training accuracy=>  0.043246771949845164
         Test accuracy=>  0.25333847292542055
```