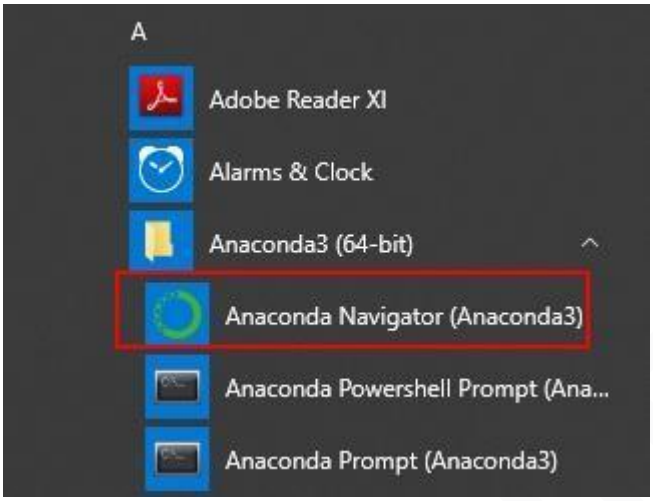
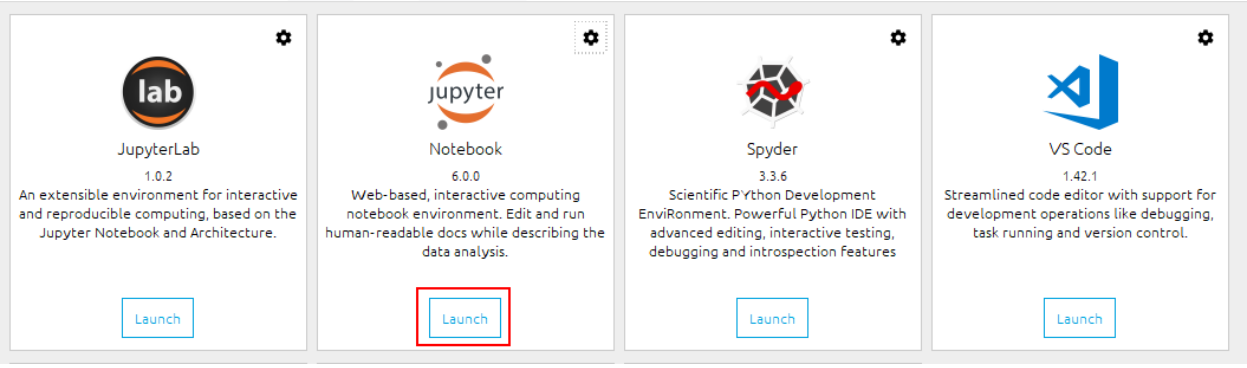
Module 11: Hands-On: 3

Linear Discriminant Analysis:

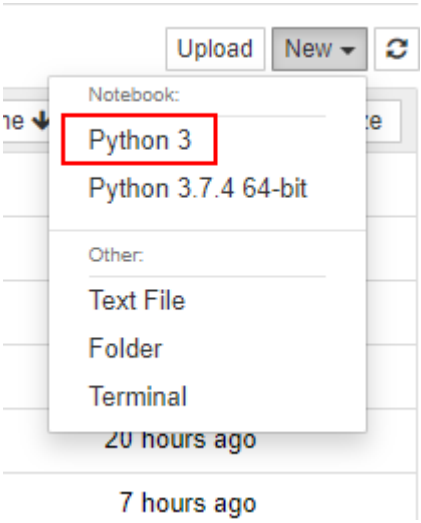
Step 1: Open Anaconda Navigator



Step 2: Click on Launch button under Jupyter Notebook



Step 3: After the notebook opens click on New and Python 3



Step 4: Import all the required modules by typing the following code in the notebook and run it by pressing shift + enter

```
In [1]: import numpy as np
        import pandas as pd
        from sklearn.metrics import confusion_matrix
        from sklearn.metrics import accuracy_score
        from sklearn.model_selection import train_test_split
        from sklearn.preprocessing import StandardScaler
        from sklearn.ensemble import RandomForestClassifier
        from sklearn.discriminant_analysis import LinearDiscriminantAnalysis as LDA
```

Step 5: Load the iris dataset

```
In [2]: url = "https://archive.ics.uci.edu/ml/machine-learning-databases/iris/iris.data"
        names = ['sepal-length', 'sepal-width', 'petal-length', 'petal-width', 'Class']
        dataset = pd.read_csv(url, names=names)
```


Step 6: Extract X and Y variables out of the dataset

```
In [3]: X = dataset.iloc[:, 0:4].values
        y = dataset.iloc[:, 4].values
```

Step 7: Split the data into 70 percent for training and 30 percent testing

```
In [11]: X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=0)
```

Step 8: Scale the data

```
In [5]: sc = StandardScaler()
        X_train = sc.fit_transform(X_train)
        X_test = sc.transform(X_test)
```

Step 9: Create a RandomForestClassifier train it on scaled data and print its accuracy score and confusion matrix

```
In [17]: classifier = RandomForestClassifier(max_depth=2, random_state=0)
         classifier.fit(X_train, y_train)
         y_pred = classifier.predict(X_test)
```

```
C:\Users\Intellipaat-Team\Anaconda3\lib\site-packages\sklearn\ens
imators will change from 10 in version 0.20 to 100 in 0.22.
  "10 in version 0.20 to 100 in 0.22.", FutureWarning)
```

```
In [18]: cm = confusion_matrix(y_test, y_pred)
         print(cm)
         print('Accuracy' + str(accuracy_score(y_test, y_pred)))
```

```
[[16  0  0]
 [ 0 17  1]
 [ 0  1 10]]
Accuracy0.9555555555555556
```

Step 9: Create n LDA instance and transform x_train and x_test

```
In [8]: lda = LDA(n_components=1)
        X_train = lda.fit_transform(X_train, y_train)
        X_test = lda.transform(X_test)
```

Step 10: Create a RandomForestClassifier train it on scaled and transformed data and print its accuracy score and confusion matrix

```
In [20]: classifier = RandomForestClassifier(max_depth=2, random_state=0)
         classifier.fit(X_train, y_train)
         y_pred = classifier.predict(X_test)

C:\Users\Intellipaat-Team\Anaconda3\lib\site-packages\sklearn\ensemble\forest.py:245: FutureWarning: The default value of n_est
imators will change from 10 in version 0.20 to 100 in 0.22.
  "10 in version 0.20 to 100 in 0.22.", FutureWarning)

In [21]: cm = confusion_matrix(y_test, y_pred)
         print(cm)
         print('Accuracy' + str(accuracy_score(y_test, y_pred)))

[[16  0  0]
 [ 0 17  1]
 [ 0  0 11]]
Accuracy0.9777777777777777
```

Step 12: Call the perform_pca method with n_components set to a number from 1 to 4 and print their confusion matrix and accuracy scores

```
In [55]: for x in range(1, 5): perfrom_pca(x)
```

```
[[16  0  0]
 [ 0 15  3]
 [ 0  1 10]]
Accuracy 0.9111111111111111


[[15  1  0]
 [ 0  7 11]
 [ 0  1 10]]
Accuracy 0.7111111111111111


[[14  0  2]
 [ 0 13  5]
 [ 0  1 10]]
Accuracy 0.8222222222222222


[[16  0  0]
 [ 0 15  3]
 [ 0  0 11]]
Accuracy 0.9333333333333333
```

