ASSIGNMENT 6

Data Analytics III

In [1]:

```
import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:

```
iris=pd.read_csv('Iris.csv')
```

In [3]:

```
iris.head()
```

Out[3]:

	Sepal Length	Sepal Width	Petal Length	Petal Width	Species
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa

In [4]:

```
iris['Species'].unique()
```

Out[4]:

```
array(['Iris-setosa', 'Iris-versicolor', 'Iris-virginica'], dtype=object)
```

In [5]:

```
iris.describe(include='all')
```

Out[5]:

	Sepal Length	Sepal Width	Petal Length	Petal Width	Species
count	150.000000	150.000000	150.000000	150.000000	150
unique	NaN	NaN	NaN	NaN	3
top	NaN	NaN	NaN	NaN	Iris-versicolor
freq	NaN	NaN	NaN	NaN	50
mean	5.843333	3.054000	3.758667	1.198667	NaN
std	0.828066	0.433594	1.764420	0.763161	NaN
min	4.300000	2.000000	1.000000	0.100000	NaN
25%	5.100000	2.800000	1.600000	0.300000	NaN
50%	5.800000	3.000000	4.350000	1.300000	NaN
75%	6.400000	3.300000	5.100000	1.800000	NaN
max	7.900000	4.400000	6.900000	2.500000	NaN

In [6]:

```
iris.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   Sepal Length  150 non-null    float64
 1   Sepal Width   150 non-null    float64
 2   Petal Length  150 non-null    float64
 3   Petal Width   150 non-null    float64
 4   Species       150 non-null    object 
dtypes: float64(4), object(1)
memory usage: 6.0+ KB
```

In [7]:

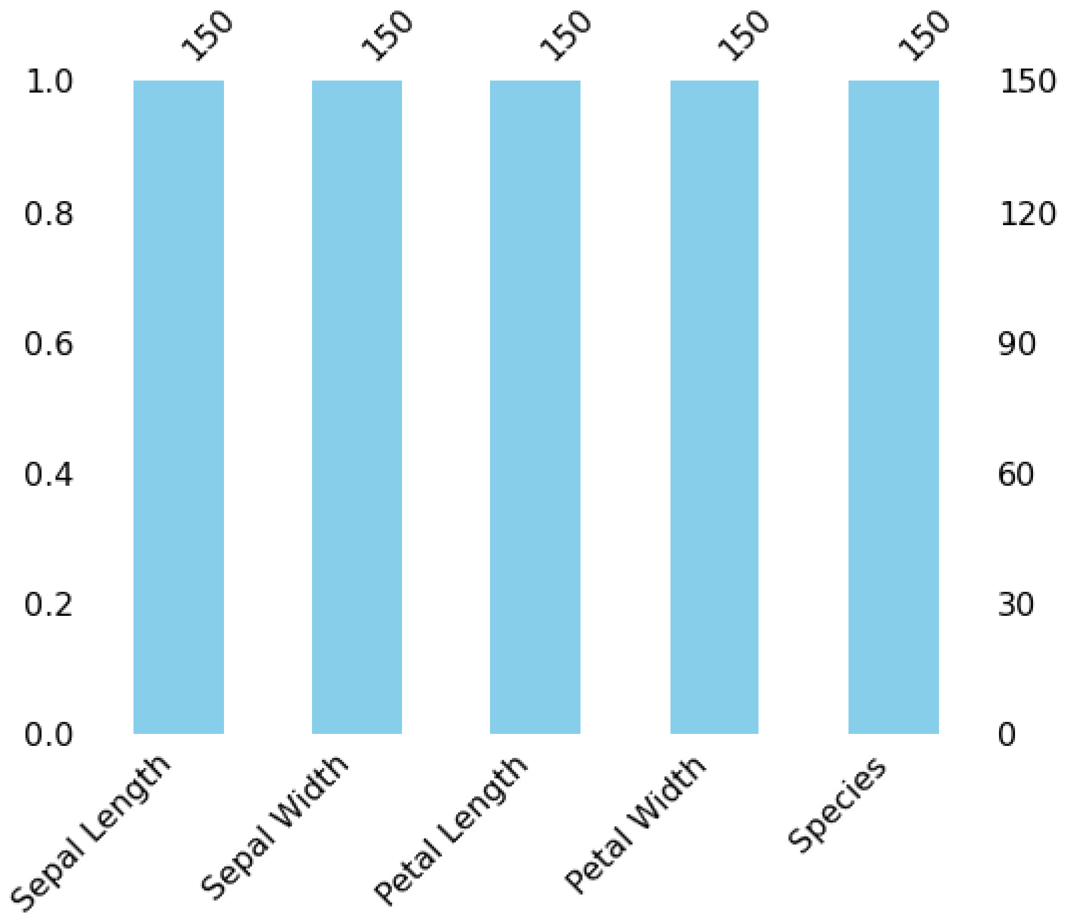
```
iris.isnull().sum()
```

Out[7]:

```
Sepal Length    0
Sepal Width     0
Petal Length    0
Petal Width     0
Species         0
dtype: int64
```

In [8]:

```
import missingno as msno
msno.bar(iris,figsize=(8,6),color='skyblue')
plt.show()
```



In [9]:

```
X=iris.iloc[:,0:4].values
y=iris.iloc[:,4].values
```

In [10]:

```
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
y = le.fit_transform(y)
```

In [11]:

```
from sklearn.metrics import make_scorer, accuracy_score,precision_score
from sklearn.metrics import classification_report
from sklearn.metrics import confusion_matrix
from sklearn.metrics import accuracy_score ,precision_score,recall_score,f1_score

#Model Select
from sklearn.model_selection import KFold,train_test_split,cross_val_score
from sklearn.ensemble import RandomForestClassifier
from sklearn.model_selection import train_test_split
from sklearn.linear_model import  LogisticRegression
from sklearn.ensemble import RandomForestClassifier
from sklearn import linear_model
from sklearn.linear_model import SGDClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.svm import SVC, LinearSVC
from sklearn.naive_bayes import GaussianNB
```

In [12]:

```
X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.3,random_state=0)
```

In [13]:

```
random_forest = RandomForestClassifier(n_estimators=100)
random_forest.fit(X_train, y_train)
Y_prediction = random_forest.predict(X_test)
accuracy_rf=round(accuracy_score(y_test,Y_prediction)* 100, 2)
acc_random_forest = round(random_forest.score(X_train, y_train) * 100, 2)


cm = confusion_matrix(y_test, Y_prediction)
accuracy = accuracy_score(y_test,Y_prediction)
precision =precision_score(y_test, Y_prediction,average='micro')
recall =  recall_score(y_test, Y_prediction,average='micro')
f1 = f1_score(y_test,Y_prediction,average='micro')
print('Confusion matrix for Random Forest\n',cm)
print('Accuracy_random_Forest : %.3f' %accuracy)
print('Precision_random_Forest : %.3f' %precision)
print('Recall_random_Forest : %.3f' %recall)
print('f1-score_random_Forest : %.3f' %f1)
```

```
Confusion matrix for Random Forest
 [[16  0  0]
 [ 0 17  1]
 [ 0  0 11]]
Accuracy_random_Forest : 0.978
Precision_random_Forest : 0.978
Recall_random_Forest : 0.978
f1-score_random_Forest : 0.978
```

In [14]:

```
logreg = LogisticRegression(solver= 'lbfgs',max_iter=400)
logreg.fit(X_train, y_train)
Y_pred = logreg.predict(X_test)
accuracy_lr=round(accuracy_score(y_test,Y_pred)* 100, 2)
acc_log = round(logreg.score(X_train, y_train) * 100, 2)


cm = confusion_matrix(y_test, Y_pred,)
accuracy = accuracy_score(y_test,Y_pred)
precision =precision_score(y_test, Y_pred,average='micro')
recall =  recall_score(y_test, Y_pred,average='micro')
f1 = f1_score(y_test,Y_pred,average='micro')
print('Confusion matrix for Logistic Regression\n',cm)
print('Accuracy_Logistic Regression : %.3f' %accuracy)
print('Precision_Logistic Regression : %.3f' %precision)
print('Recall_Logistic Regression: %.3f' %recall)
print('f1-score_Logistic Regression : %.3f' %f1)
```

```
Confusion matrix for Logistic Regression
 [[16  0  0]
 [ 0 17  1]
 [ 0  0 11]]
Accuracy_Logistic Regression : 0.978
Precision_Logistic Regression : 0.978
Recall_Logistic Regression: 0.978
f1-score_Logistic Regression : 0.978
```

In [15]:

```
knn = KNeighborsClassifier(n_neighbors = 3)
knn.fit(X_train, y_train)
Y_pred = knn.predict(X_test)
accuracy_knn=round(accuracy_score(y_test,Y_pred)* 100, 2)
acc_knn = round(knn.score(X_train, y_train) * 100, 2)

cm = confusion_matrix(y_test, Y_pred)
accuracy = accuracy_score(y_test,Y_pred)
precision =precision_score(y_test, Y_pred,average='micro')
recall =  recall_score(y_test, Y_pred,average='micro')
f1 = f1_score(y_test,Y_pred,average='micro')
print('Confusion matrix for KNN\n',cm)
print('Accuracy_KNN : %.3f' %accuracy)
print('Precision_KNN : %.3f' %precision)
print('Recall_KNN: %.3f' %recall)
print('f1-score_KNN : %.3f' %f1)
```

```
Confusion matrix for KNN
 [[16  0  0]
 [ 0 17  1]
 [ 0  0 11]]
Accuracy_KNN : 0.978
Precision_KNN : 0.978
Recall_KNN: 0.978
f1-score_KNN : 0.978
```

In [16]:

```
gaussian = GaussianNB()
gaussian.fit(X_train, y_train)
Y_pred = gaussian.predict(X_test)
accuracy_nb=round(accuracy_score(y_test,Y_pred)* 100, 2)
acc_gaussian = round(gaussian.score(X_train, y_train) * 100, 2)

cm = confusion_matrix(y_test, Y_pred)
accuracy = accuracy_score(y_test,Y_pred)
precision =precision_score(y_test, Y_pred,average='micro')
recall =  recall_score(y_test, Y_pred,average='micro')
f1 = f1_score(y_test,Y_pred,average='micro')
print('Confusion matrix for Naive Bayes\n',cm)
print('Accuracy_Naive Bayes: %.3f' %accuracy)
print('Precision_Naive Bayes: %.3f' %precision)
print('Recall_Naive Bayes: %.3f' %recall)
print('f1-score_Naive Bayes : %.3f' %f1)
```

```
Confusion matrix for Naive Bayes
 [[16  0  0]
 [ 0 18  0]
 [ 0  0 11]]
Accuracy_Naive Bayes: 1.000
Precision_Naive Bayes: 1.000
Recall_Naive Bayes: 1.000
f1-score_Naive Bayes : 1.000
```