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EXP	**8 Implementation of a Supervised Machine Le algorithms for an experimental**

AIM : To find the best fitting algorithm for an Iris classifier dataset.

About the dataset:
The Iris is a violet-blue flower which has many species. However, for this experiment we will use 3 almost identical-looking species. They are *Setosa, Versicolor and Viginica*. The flowers of each individual species have some ranges of measures of Sepal and Petal widths and lengths. In this experiment we will try tounderstand something similar.

Glimpse of the Dataset:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	Iris-setosa
1	2	4.9	3.0	1.4	0.2	Iris-setosa
2	3	4.7	3.2	1.3	0.2	Iris-setosa
3	4	4.6	3.1	1.5	0.2	Iris-setosa
4	5	5.0	3.6	1.4	0.2	Iris-setosa
5	6	5.4	3.9	1.7	0.4	Iris-setosa
6	7	4.6	3.4	1.4	0.3	Iris-setosa
7	8	5.0	3.4	1.5	0.2	Iris-setosa
8	9	4.4	2.9	1.4	0.2	Iris-setosa
9	10	4.9	3.1	1.5	0.1	Iris-setosa

We shall make use of this dataset for our experiment.

Procedure:

Proposed algorithm #1 : Support Vector Classifier

```
lsvc = LinearSVC(max_iter=4000)
lsvc.fit(X_train,y_train)
y_pred = lsvc.predict(X_test)
acc_lsvc = round(accuracy_score(y_test,y_pred)*100,2)
lsvc_acc = round(lsvc.score(X_train,y_train)*100,2)
cm = confusion_matrix(y_test,y_pred)
acc = accuracy_score(y_test,y_pred)
prec = 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 of K Nearest Neighbour\n",cm)
print("\nAccuracy of K Nearest Neighbour = ",acc)
print("\nPrecision of K Nearest Neighbour = ",prec)
print("\nRecall of K Nearest Neighbour = ",recall)
print("\nf1 score of K Nearest Neighbour = ",f1)
```

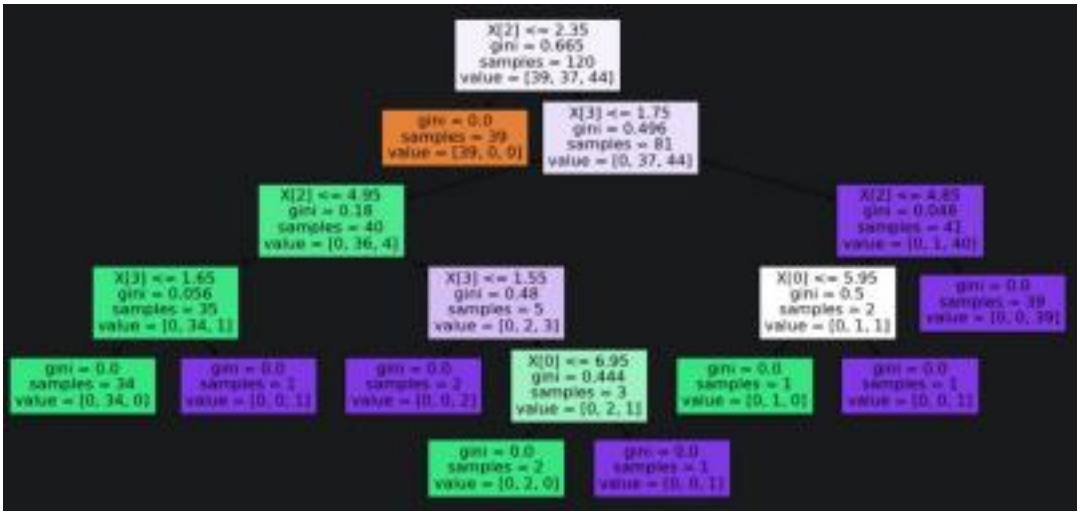
Proposed algorithm #2 : Gaussian Naive Bayes

```
gauss = GaussianNB()
gauss.fit(X_train,y_train)
y_pred = gauss.predict(X_test)
acc_gauss = round(accuracy_score(y_test,y_pred)*100,2)
gauss_acc = round(gauss.score(X_train,y_train)*100,2)
cm = confusion_matrix(y_test,y_pred)
acc = accuracy_score(y_test,y_pred)
prec = 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 of K Nearest Neighbour\n",cm)
print("\nAccuracy of K Nearest Neighbour = ",acc)
print("\nPrecision of K Nearest Neighbour = ",prec)
print("\nRecall of K Nearest Neighbour = ",recall)
print("\nf1 score of K Nearest Neighbour = ",f1)
```

Proposed algorithm #3 : Decision Tree Classifier

```
dt = DecisionTreeClassifier()
dt.fit(X_train,y_train)
y_pred = dt.predict(X_test)
acc_dt = round(accuracy_score(y_test,y_pred)*100,2)
dt_acc = round(dt.score(X_train,y_train)*100,2)
cm = confusion_matrix(y_test,y_pred)
acc = accuracy_score(y_test,y_pred)
prec = 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 of K Nearest Neighbour\n",cm)
print("\nAccuracy of K Nearest Neighbour = ",acc)
print("\nPrecision of K Nearest Neighbour = ",prec)
print("\nRecall of K Nearest Neighbour = ",recall)
print("\nf1 score of K Nearest Neighbour = ",f1)
```

Decision Tree Generated:



Proposed algorithm #4 : Random Forest Classifier

```
rf = RandomForestClassifier(n_estimators=100)
rf.fit(X_train,y_train)
y_pred = rf.predict(X_test)
acc_rf = round(accuracy_score(y_test,y_pred)*100,2)
rf_acc = round(rf.score(X_train,y_train)*100,2)
cm = confusion_matrix(y_test,y_pred)
acc = accuracy_score(y_test,y_pred)
prec = 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 of Random Forest\n",cm)
print("Accuracy of Random Forest = ",acc)
print("Precision of Random Forest = ",prec)
print("Recall of Random Forest = ",recall)
print("f1 score of Random Forest = ",f1)
```

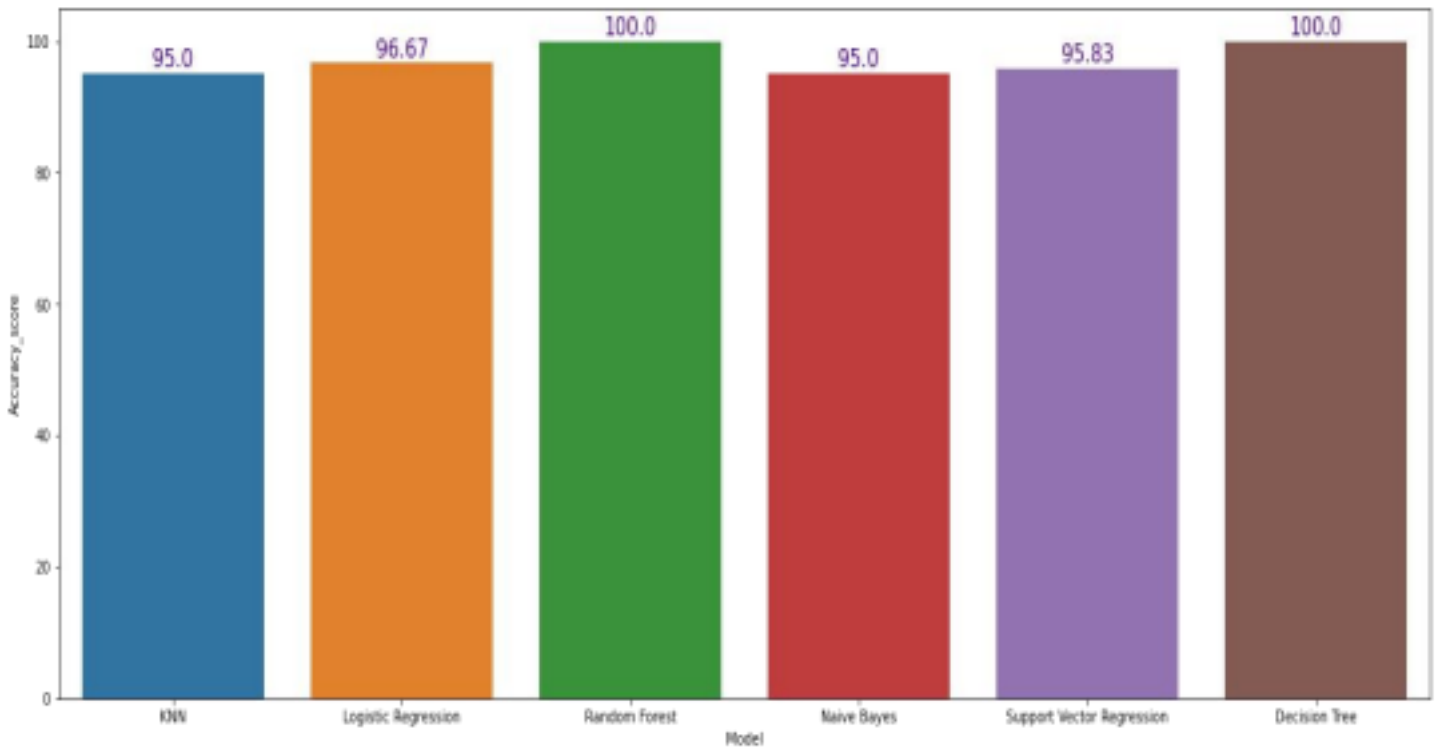
Proposed algorithm #5 : Logistic Regression

```
lg = LogisticRegression(solver='lbfgs',max_iter=400)
lg.fit(X_train,y_train)
y_pred = lg.predict(X_test)
acc_lg = round(accuracy_score(y_test,y_pred)*100,2)
lg_acc = round(lg.score(X_train,y_train)*100,2)
cm = confusion_matrix(y_test,y_pred)
acc = accuracy_score(y_test,y_pred)
prec = 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 of Logistic Regression\n",cm)
print("\nAccuracy of Logistic Regression = ",acc)
print("\nPrecision of Logistic Regression = ",prec)
print("\nRecall of Logistic Regression = ",recall)
print("\nf1 score of Logistic Regression = ",f1)
```

Proposed algorithm #6 : K-Nearest Neighbours

```
knn = KNeighborsClassifier(n_neighbors=3)
knn.fit(X_train,y_train)
y_pred = knn.predict(X_test)
acc_knn = round(accuracy_score(y_test,y_pred)*100,2)
knn_acc = round(knn.score(X_train,y_train)*100,2)
cm = confusion_matrix(y_test,y_pred)
acc = accuracy_score(y_test,y_pred)
prec = 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 of K Nearest Neighbour\n",cm)
print("\nAccuracy of K Nearest Neighbour = ",acc)
print("\nPrecision of K Nearest Neighbour = ",prec)
print("\nRecall of K Nearest Neighbour = ",recall)
print("\nf1 score of K Nearest Neighbour = ",f1)
```

Evaluation of Performance:



Conclusion:

The model accuracy of the Random Forest and Decision Tree are 100%. But this doesnotmean that the models are the best. Rather they are overfitted and will tendtoyieldastereotypic result for any more variations in the dataset. So we will rule themout.

Apart from them, we can see that Logistic Regression has a the highest accuracyscoreof96.67% which is a very good accuracy. This also has least probable changes of overfitting.So, the best model for the analysis is "**Logistic Regression"**