## Problem Statement or Requirement:

A requirement from the Hospital, Management asked us to create a predictive model which will predict the Chronic Kidney Disease (CKD) based on the several parameters. The Client has provided the dataset of the same.

1.) Identify your problem statement

**We need to predict the Chronic Kidney Disease based on the given parameters in the dataset.**
**Machine Learning > Supervised Learning > Classification**

2.) Tell basic info about the dataset (Total number of rows, columns)

**Total number of columns:25**
**Total number of rows: 249**
**Independent/Input: 24 columns**
**Dependent/Output: 1 column**

3.) Mention the pre-processing method if you're doing any (like converting string to number – nominal data)

**I have used pd.get_dummies which converted strings into int and standard scaler to optimize the difference between data**

4.) Develop a good model with good evaluation metric. You can use any machine learning algorithm; you can create many models. Finally, you have to come up with final model.

**I have created classification models**

**1.SVM**
**2.Decision Tree**
**3.Random Forest**
**4.Logistic Regression**
**5.KNN**
**6.Multinomial Naïve Bayes**
**7.Categorical Naïve Bayes**
**8.Complement Naïve Bayes**
**9.Gaussian Naïve Bayes**
**10.Bernoulli Naïve Bayes**

5.) All the research values of each algorithm should be documented. (You can make tabulation or screenshot of the results.)

**Please refer below**

jupyter 1.SVM Classification Last Checkpoint: 6 hours ago

File Edit View Run Kernel Settings Help

Code

[11]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(dep, grid_predictions)
```

[12]:
```
print(cm)
```

```
[[150   0]
 [  0 249]]
```

[13]:
```
from sklearn.metrics import classification_report
clf_report = classification_report(dep, grid_predictions)
```

[14]:
```
print(clf_report)
```

```
              precision    recall  f1-score   support

           0       1.00      1.00      1.00       150
           1       1.00      1.00      1.00       249

    accuracy                           1.00       399
   macro avg       1.00      1.00      1.00       399
weighted avg       1.00      1.00      1.00       399
```

[15]:
```
from sklearn.metrics import roc_auc_score

roc_auc_score(dep,grid.predict_proba(indep)[:,1])
```

[15]:
```
1.0
```

jupyter 2.Decision Tree Classification Last Checkpoint: 6 hours ago

File Edit View Run Kernel Settings Help

Code

[10]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(dep, grid_predictions)
```

[11]:
```
print(cm)
```

```
[[150   0]
 [  0 249]]
```

[12]:
```
from sklearn.metrics import classification_report
clf_report = classification_report(dep, grid_predictions)
```

[13]:
```
print(clf_report)
```

```
              precision    recall  f1-score   support

           0       1.00      1.00      1.00       150
           1       1.00      1.00      1.00       249

    accuracy                           1.00       399
   macro avg       1.00      1.00      1.00       399
weighted avg       1.00      1.00      1.00       399
```

[14]:
```
from sklearn.metrics import roc_auc_score

roc_auc_score(dep,grid.predict_proba(indep)[:,1])
```

[14]:
```
1.0
```

jupyter 3.Random Forest Classification Last Checkpoint: 5 hours ago

File Edit View Run Kernel Settings Help

Code

[11]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(dep, grid_predictions)
```

[12]:
```
print(cm)
```

```
[[150   0]
 [  0 249]]
```

[13]:
```
from sklearn.metrics import classification_report
clf_report = classification_report(dep, grid_predictions)
```

[14]:
```
print(clf_report)
```

```
              precision    recall  f1-score   support

           0       1.00      1.00      1.00       150
           1       1.00      1.00      1.00       249

    accuracy                           1.00       399
   macro avg       1.00      1.00      1.00       399
weighted avg       1.00      1.00      1.00       399
```

[15]:
```
from sklearn.metrics import roc_auc_score

roc_auc_score(dep,grid.predict_proba(indep)[:,1])
```

[15]:
```
1.0
```

jupyter 4.Logistic Regression Classification Last Checkpoint: 6 hours ago

File Edit View Run Kernel Settings Help

Code

[10]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(dep, grid_predictions)
```

[11]:
```
print(cm)
```

```
[[150   0]
 [  0 249]]
```

[12]:
```
from sklearn.metrics import classification_report
clf_report = classification_report(dep, grid_predictions)
```

[13]:
```
print(clf_report)
```

```
              precision    recall  f1-score   support

           0       1.00      1.00      1.00       150
           1       1.00      1.00      1.00       249

    accuracy                           1.00       399
   macro avg       1.00      1.00      1.00       399
weighted avg       1.00      1.00      1.00       399
```

[14]:
```
from sklearn.metrics import roc_auc_score

roc_auc_score(dep,grid.predict_proba(indep)[:,1])
```

[14]:
```
1.0
```

jupyter 5.K Nearest Neighbor Classification Last Checkpoint: 6 hours ago

File Edit View Run Kernel Settings Help

Code

[10]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(dep, grid_predictions)
```

[11]:
```
print(cm)
```

```
[[150   0]
 [  8 241]]
```

[12]:
```
from sklearn.metrics import classification_report
clf_report = classification_report(dep, grid_predictions)
```

[13]:
```
print(clf_report)
```

```
              precision    recall  f1-score   support

           0       0.95      1.00      0.97       150
           1       1.00      0.97      0.98       249

    accuracy                           0.98       399
   macro avg       0.97      0.98      0.98       399
weighted avg       0.98      0.98      0.98       399
```

[14]:
```
from sklearn.metrics import roc_auc_score

roc_auc_score(dep,grid.predict_proba(indep)[:,1])
```

[14]:
```
0.9998527443105756
```

jupyter 6.Naive Bayes Classification - Multinomial Last Checkpoint: 2 hours ago

File Edit View Run Kernel Settings Help

Code

[9]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(dep, grid_predictions)
```

[10]:
```
print(cm)
```

```
[[145   5]
 [ 39 210]]
```

[11]:
```
from sklearn.metrics import classification_report
clf_report = classification_report(dep, grid_predictions)
```

[12]:
```
print(clf_report)
```

```
              precision    recall  f1-score   support

           0       0.79      0.97      0.87       150
           1       0.98      0.84      0.91       249

    accuracy                           0.89       399
   macro avg       0.88      0.91      0.89       399
weighted avg       0.91      0.89      0.89       399
```

[13]:
```
from sklearn.metrics import roc_auc_score

roc_auc_score(dep,grid.predict_proba(indep)[:,1])
```

[13]:
```
0.9623025435073628
```

jupyter 7.Naive Bayes Classification - Categorical Last Checkpoint: 27 minutes ago

File Edit View Run Kernel Settings Help

Code

[9]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(dep, grid_predictions)
```

[10]:
```
print(cm)
```

```
[[150   0]
 [  1 248]]
```

[11]:
```
from sklearn.metrics import classification_report
clf_report = classification_report(dep, grid_predictions)
```

[12]:
```
print(clf_report)
```

```
              precision    recall  f1-score   support

           0       0.99      1.00      1.00       150
           1       1.00      1.00      1.00       249

    accuracy                           1.00       399
   macro avg       1.00      1.00      1.00       399
weighted avg       1.00      1.00      1.00       399
```

[13]:
```
from sklearn.metrics import roc_auc_score

roc_auc_score(dep,grid.predict_proba(indep)[:,1])
```

[13]:
```
1.0
```

jupyter 8.Naive Bayes Classification - Complement Last Checkpoint: 26 minutes ago

File Edit View Run Kernel Settings Help

Code

[9]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(dep, grid_predictions)
```

[10]:
```
print(cm)
```

```
[[145   5]
 [ 39 210]]
```

[11]:
```
from sklearn.metrics import classification_report
clf_report = classification_report(dep, grid_predictions)
```

[12]:
```
print(clf_report)
```

```
              precision    recall  f1-score   support

           0       0.79      0.97      0.87       150
           1       0.98      0.84      0.91       249

    accuracy                           0.89       399
   macro avg       0.88      0.91      0.89       399
weighted avg       0.91      0.89      0.89       399
```

[13]:
```
from sklearn.metrics import roc_auc_score

roc_auc_score(dep,grid.predict_proba(indep)[:,1])
```

[13]:
```
0.9623025435073628
```

jupyter 9.Naive Bayes Classification - Gaussian Last Checkpoint: 24 minutes ago

File Edit View Run Kernel Settings Help

Code

[9]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(dep, grid_predictions)
```

[10]:
```
print(cm)
```

```
[[149   1]
 [  4 245]]
```

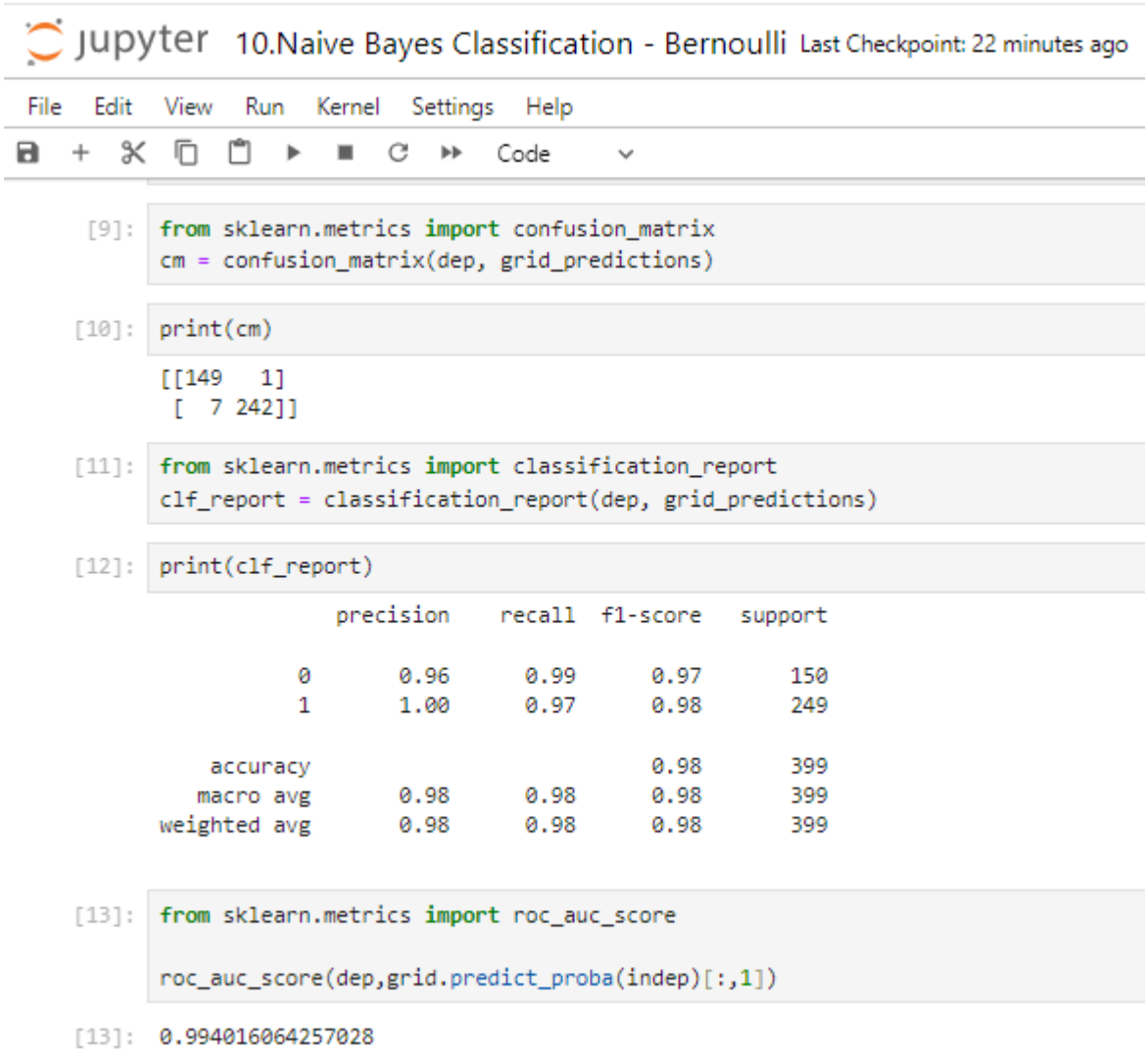
[11]:
```
from sklearn.metrics import classification_report
clf_report = classification_report(dep, grid_predictions)
```

[12]:
```
print(clf_report)
```

```
              precision    recall  f1-score   support

           0       0.97      0.99      0.98       150
           1       1.00      0.98      0.99       249

    accuracy                           0.99       399
   macro avg       0.98      0.99      0.99       399
weighted avg       0.99      0.99      0.99       399
```

[13]:
```
from sklearn.metrics import roc_auc_score

roc_auc_score(dep,grid.predict_proba(indep)[:,1])
```

[13]:
```
0.996532797858099
```




6.) Mention your final model, justify why u have chosen the same.

**All the below algorithm has given high accuracy so used Random Forest**

**1.SVM**
**2.Decision Tree**
**3.Random Forest**
**4.Logistic Regression**

**Best hyper parameter in Random Forest: {'criterion': 'gini', 'max_features': 'log2', 'n_estimators': 10}**
**Accuracy: 1.00**
**roc_auc_score: 1.0**

jupyter 3.Random Forest Classification Last Checkpoint: 4 hours ago

File Edit View Run Kernel Settings Help

Code

[11]:
```
grid_predictions = grid.predict(indep)
```

[12]:
```
print("Best parameters found: ", grid.best_params_)
```

```
Best parameters found:  {'criterion': 'gini', 'max_features': 'log2', 'n_estimators': 10}
```

[13]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(dep, grid_predictions)
```

[14]:
```
print(cm)
```

```
[[150   0]
 [  0 249]]
```

[15]:
```
from sklearn.metrics import classification_report
clf_report = classification_report(dep, grid_predictions)
```

[16]:
```
print(clf_report)
```

```
              precision    recall  f1-score   support

           0       1.00      1.00      1.00       150
           1       1.00      1.00      1.00       249

    accuracy                           1.00       399
   macro avg       1.00      1.00      1.00       399
weighted avg       1.00      1.00      1.00       399
```

[17]:
```
from sklearn.metrics import roc_auc_score

roc_auc_score(dep,grid.predict_proba(indep)[:,1])
```

[17]:
```
1.0
```