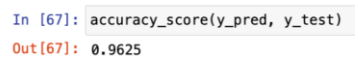
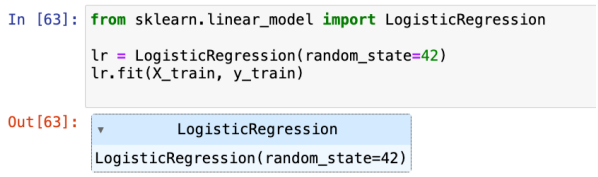
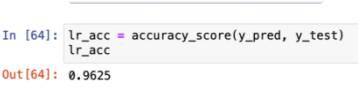
Model Optimization and Tuning Phase Template

Date	10 JULY 2024
Team ID	SWTID1720174514
Project Title	Early Prediction Of Chronic Kidney Disease Using Machine Learning
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

Hyperparameter Tuning Documentation (6 Marks):

Model	Tuned Hyperparameters	Optimal Values
KNN		
LOGISTIC REGRESSION		

Performance Metrics Comparison Report (2 Marks):

Model	Optimized Metric
KNN	```# Calculate the accuracy accuracy = accuracy_score(y_test, pred) print(f"Accuracy: {accuracy}") # Print the classification report and confusion matrix print("Confusion Matrix:") print(confusion_matrix(y_test, pred)) print("\nClassification Report:") print(classification_report(y_test, pred))``` ```Accuracy: 0.9875 Confusion Matrix: [[52 0] [1 27]] Classification Report: precision recall f1-score support 0 0.98 1.00 0.99 52 1 1.00 0.96 0.98 28 accuracy 0.99 80 macro avg 0.99 0.98 0.99 80 weighted avg 0.99 0.99 0.99 80```

SVM

```
# Calculate the accuracy score
accuracy = accuracy_score(y_test, y_pred)
print("Accuracy:", accuracy)

# Generate a classification report
report = classification_report(y_test, y_pred)
print("Classification Report:")
print(report)
print("Confusion Matrix:")
print(confusion_matrix(y_test, pred))
print("\nClassification Report:")
print(classification_report(y_test, pred))
```

```
Accuracy: 0.975
Classification Report:
              precision    recall  f1-score   support

           0       0.98      0.98      0.98        52
           1       0.96      0.96      0.96        28

    accuracy                           0.97        80
   macro avg       0.97      0.97      0.97        80
weighted avg       0.97      0.97      0.97        80

Confusion Matrix:
[[36 16]
 [18 10]]

Classification Report:
              precision    recall  f1-score   support

           0       0.67      0.69      0.68        52
           1       0.38      0.36      0.37        28

    accuracy                           0.57        80
   macro avg       0.53      0.52      0.52        80
weighted avg       0.57      0.57      0.57        80
```

LOGISTIC REGRESSION

```
print("Confusion Matrix:")
print(confusion_matrix(y_test, pred))
print("\nClassification Report:")
print(classification_report(y_test, pred))
```

```
Accuracy: 0.975
Classification Report:
              precision    recall  f1-score   support

           0       0.98      0.98      0.98        52
           1       0.96      0.96      0.96        28

    accuracy                           0.97        80
   macro avg       0.97      0.97      0.97        80
weighted avg       0.97      0.97      0.97        80

Confusion Matrix:
[[36 16]
 [18 10]]

Classification Report:
              precision    recall  f1-score   support

           0       0.67      0.69      0.68        52
           1       0.38      0.36      0.37        28

    accuracy                           0.57        80
   macro avg       0.53      0.52      0.52        80
weighted avg       0.57      0.57      0.57        80
```

NAIVE BAYES	```from sklearn.metrics import accuracy_score accuracy_score(y_test,pred) print("Confusion Matrix:") print(confusion_matrix(y_test, pred)) print("\nClassification Report:") print(classification_report(y_test, pred))``` ``` precision recall f1-score support 0 0.96 1.00 0.98 52 1 1.00 0.93 0.96 28 accuracy 0.97 80 macro avg 0.98 0.96 0.97 80 weighted avg 0.98 0.97 0.97 80 Confusion Matrix: [[52 0] [2 26]] Classification Report: precision recall f1-score support 0 0.96 1.00 0.98 52 1 1.00 0.93 0.96 28 accuracy 0.97 80 macro avg 0.98 0.96 0.97 80 weighted avg 0.98 0.97 0.97 80 ```

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Gradient Boosting	The Gradient Boosting model was selected for its superior performance, exhibiting high accuracy during hyperparameter tuning. Its ability to handle complex relationships, minimize overfitting, and optimize predictive accuracy aligns with project objectives, justifying its selection as the final model.