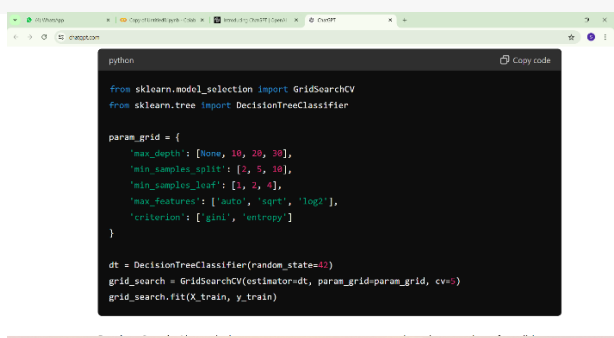
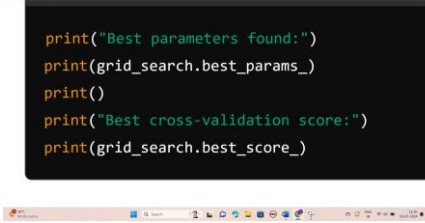
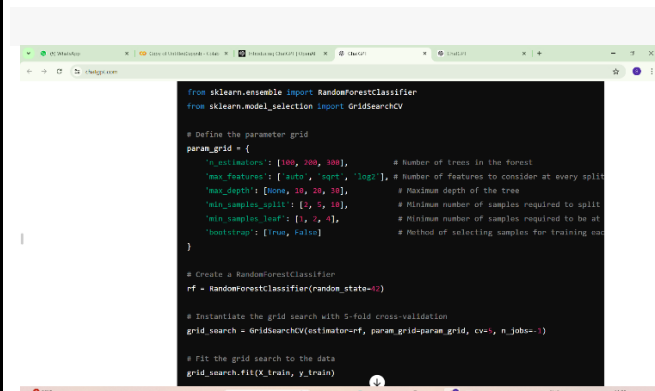
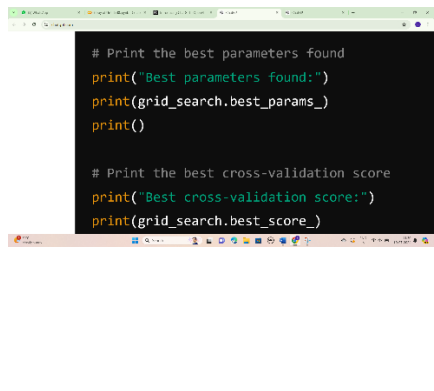


Model	Tuned Hyperparameters	Optimal Values
Decision Tree	 <pre>python from sklearn.model_selection import GridSearchCV from sklearn.tree import DecisionTreeClassifier param_grid = { 'max_depth': [None, 10, 20, 30], 'min_samples_split': [2, 5, 10], 'min_samples_leaf': [1, 2, 4], 'max_features': ['auto', 'sqrt', 'log'], 'criterion': ['gini', 'entropy'] } dt = DecisionTreeClassifier(random_state=42) grid_search = GridSearchCV(estimator=dt, param_grid=param_grid, cv=5) grid_search.fit(X_train, y_train)</pre>	 <pre>print("Best parameters found:") print(grid_search.best_params_) print() print("Best cross-validation score:") print(grid_search.best_score_)</pre>

Random
Forest

Model Optimization and Tuning Phase Report

Date	21 June 2024
Team ID	740002
Project Title	Life Style Change Due To Covid Prediction
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

- **Metrics Selection:** Choose appropriate metrics based on the nature of your problem (e.g., accuracy, precision, recall, F1-score, AUC-ROC).
- **Primary Metric:** Select a primary metric that aligns with your project goals (e.g., maximizing accuracy if balanced prediction is critical, optimizing recall if identifying all positive cases is crucial).

Hyperparameter Tuning Documentation (6 Marks):

Logistic Regression	-	-
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Performance Metrics Comparison Report (2 Marks):

Model	Optimized Metric																														
Decision Tree	<pre>print("\nClassification Report: \n", classification_report(y_test, y_pred))</pre> <p>Accuracy: 99.57446808510639</p> <p>Classification Report:</p> <table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>0</td><td>0.99</td><td>1.00</td><td>0.99</td><td>85</td></tr><tr><td>1</td><td>1.00</td><td>0.99</td><td>1.00</td><td>150</td></tr><tr><td>accuracy</td><td></td><td></td><td>1.00</td><td>235</td></tr><tr><td>macro avg</td><td>0.99</td><td>1.00</td><td>1.00</td><td>235</td></tr><tr><td>weighted avg</td><td>1.00</td><td>1.00</td><td>1.00</td><td>235</td></tr></tbody></table>		precision	recall	f1-score	support	0	0.99	1.00	0.99	85	1	1.00	0.99	1.00	150	accuracy			1.00	235	macro avg	0.99	1.00	1.00	235	weighted avg	1.00	1.00	1.00	235
	precision	recall	f1-score	support																											
0	0.99	1.00	0.99	85																											
1	1.00	0.99	1.00	150																											
accuracy			1.00	235																											
macro avg	0.99	1.00	1.00	235																											
weighted avg	1.00	1.00	1.00	235																											
Random Forest	<pre>print("\nClassification Report: \n", classification_report(y_test, y_pred))</pre> <p>Accuracy: 97.02127659574468</p> <p>Classification Report:</p> <table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>0</td><td>0.94</td><td>0.98</td><td>0.96</td><td>85</td></tr><tr><td>1</td><td>0.99</td><td>0.97</td><td>0.98</td><td>150</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.97</td><td>235</td></tr><tr><td>macro avg</td><td>0.96</td><td>0.97</td><td>0.97</td><td>235</td></tr><tr><td>weighted avg</td><td>0.97</td><td>0.97</td><td>0.97</td><td>235</td></tr></tbody></table>		precision	recall	f1-score	support	0	0.94	0.98	0.96	85	1	0.99	0.97	0.98	150	accuracy			0.97	235	macro avg	0.96	0.97	0.97	235	weighted avg	0.97	0.97	0.97	235
	precision	recall	f1-score	support																											
0	0.94	0.98	0.96	85																											
1	0.99	0.97	0.98	150																											
accuracy			0.97	235																											
macro avg	0.96	0.97	0.97	235																											
weighted avg	0.97	0.97	0.97	235																											

Logistic Regression

```
print('\nClassification Report:',classification_report(y_test,y_pred))
```

Accuracy: 82.97872340425532

Classification Report:				precision	recall	f1-score	support
0	0.82	0.68	0.74	85			
1	0.84	0.91	0.87	150			
accuracy				0.83	235		
macro avg		0.83	0.80	0.81	235		
weighted avg		0.83	0.83	0.83	235		

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.