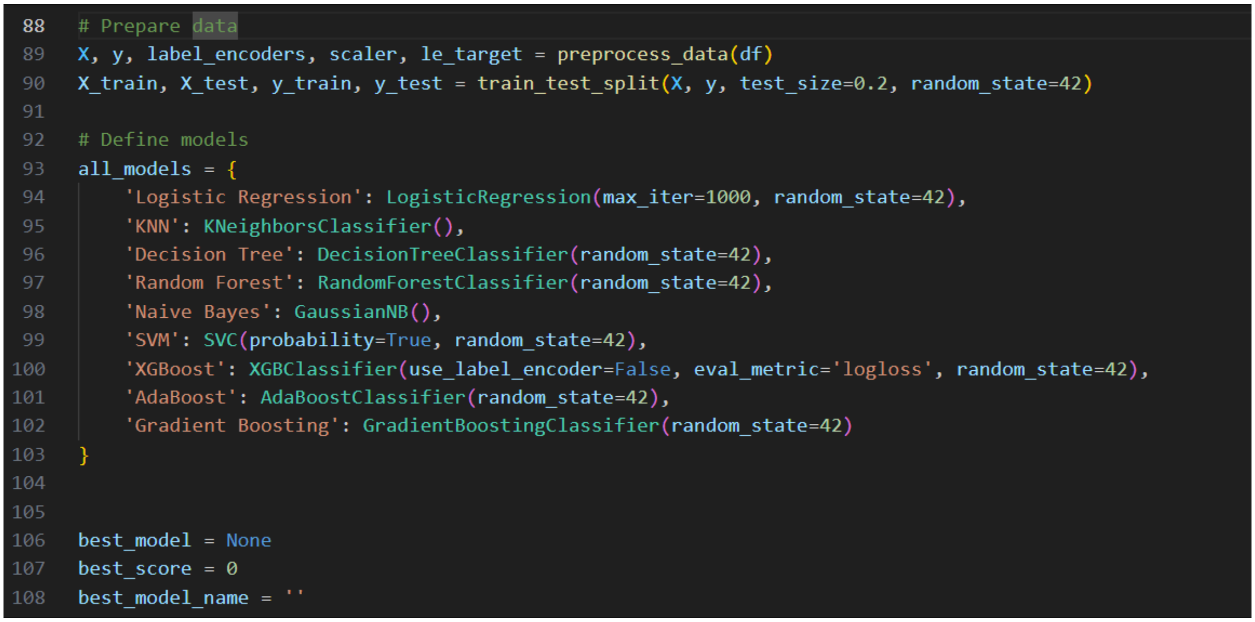
Model Development Phase Template

Date	18 June 2025
Team ID	SWTID1749709635
Project Title	Mental Health Prediction
Maximum Marks	4 Marks

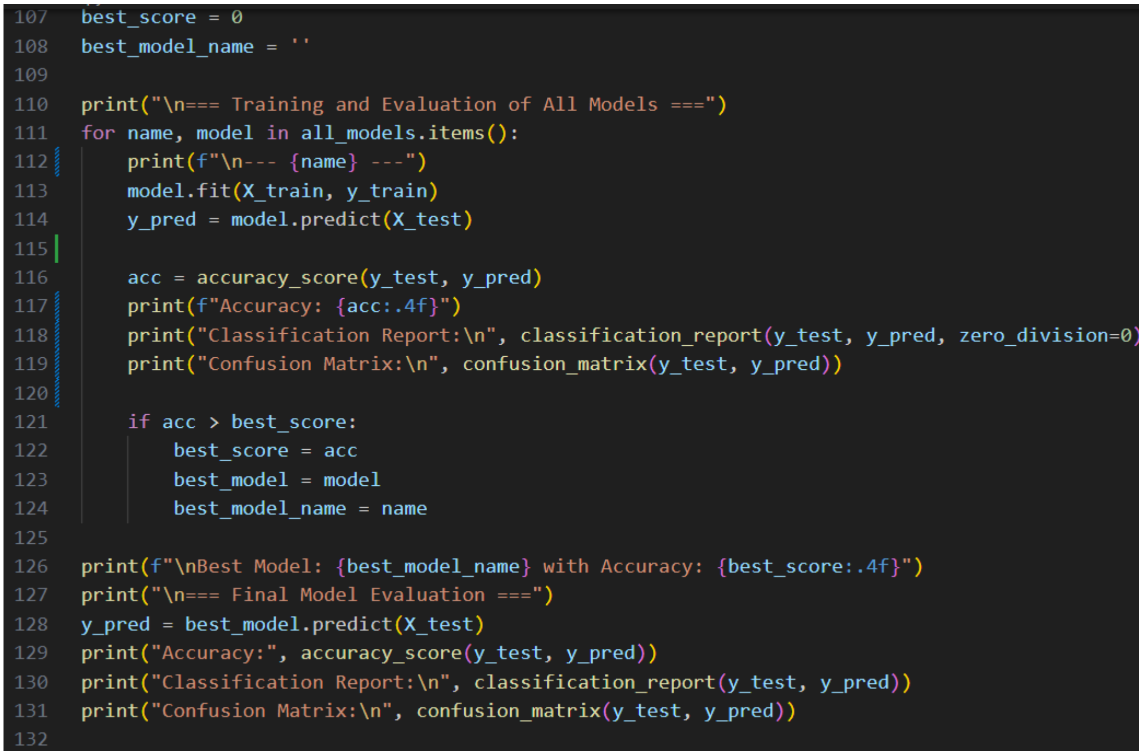
Initial Model Training Code, Model Validation and Evaluation Report

The initial model training code will be showcased in the future through a screenshot. The model validation and evaluation report will include classification reports, accuracy, and confusion matrices for multiple models, presented through respective screenshots.

Initial Model Training Code:

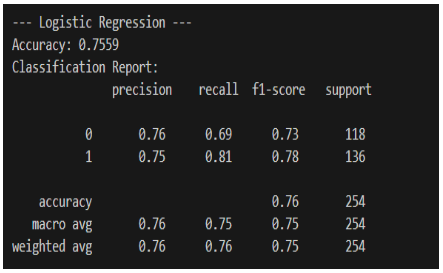
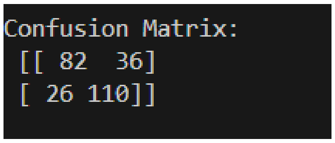
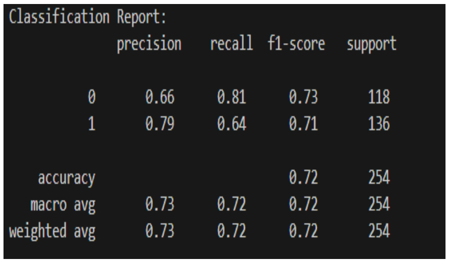
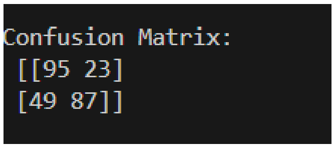


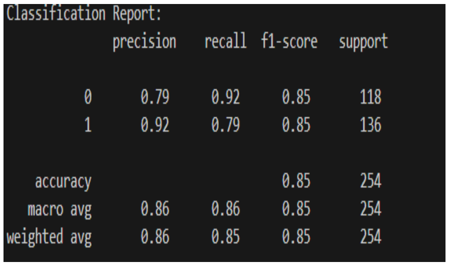
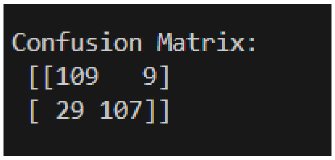
```
# Prepare data
X, y, label_encoders, scaler, le_target = preprocess_data(df)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Define models
all_models = {
    'Logistic Regression': LogisticRegression(max_iter=1000, random_state=42),
    'KNN': KNeighborsClassifier(),
    'Decision Tree': DecisionTreeClassifier(random_state=42),
    'Random Forest': RandomForestClassifier(random_state=42),
    'Naive Bayes': GaussianNB(),
    'SVM': SVC(probability=True, random_state=42),
    'XGBoost': XGBClassifier(use_label_encoder=False, eval_metric='logloss', random_state=42),
    'AdaBoost': AdaBoostClassifier(random_state=42),
    'Gradient Boosting': GradientBoostingClassifier(random_state=42)
}


best_model = None
best_score = 0
best_model_name = ''
```

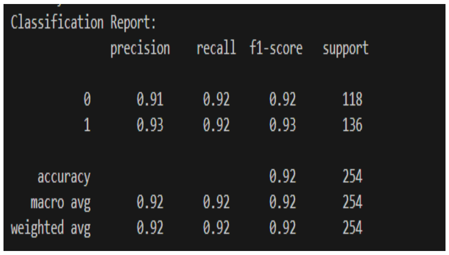
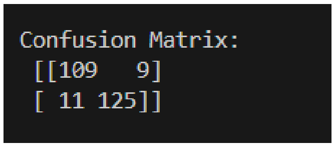


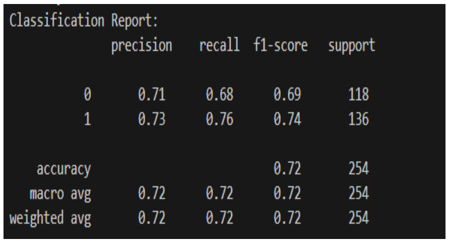
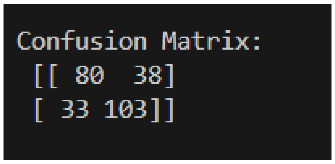
```python
best_score = 0
best_model_name = ''

print("\n=== Training and Evaluation of All Models ===")
for name, model in all_models.items():
    print(f"\n--- {name} ---")
    model.fit(X_train, y_train)
    y_pred = model.predict(X_test)

    acc = accuracy_score(y_test, y_pred)
    print(f"Accuracy: {acc:.4f}")
    print("Classification Report:\n", classification_report(y_test, y_pred, zero_division=0)
    print("Confusion Matrix:\n", confusion_matrix(y_test, y_pred))

    if acc > best_score:
        best_score = acc
        best_model = model
        best_model_name = name

print(f"\nBest Model: {best_model_name} with Accuracy: {best_score:.4f}")
print("\n=== Final Model Evaluation ===")
y_pred = best_model.predict(X_test)
print("Accuracy:", accuracy_score(y_test, y_pred))
print("Classification Report:\n", classification_report(y_test, y_pred))
print("Confusion Matrix:\n", confusion_matrix(y_test, y_pred))
```

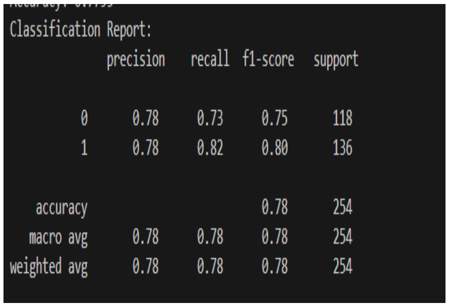
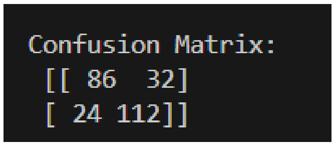
Model Validation and Evaluation Report:

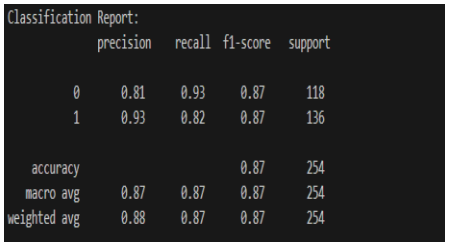
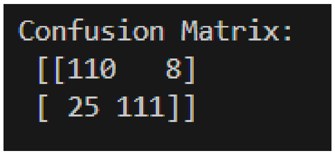
Model	Classification Report	Accuracy	Confusion Matrix
Logistic Regression	 --- Logistic Regression --- Accuracy: 0.7559 Classification Report: precision recall f1-score support 0 0.76 0.69 0.73 118 1 0.75 0.81 0.78 136 accuracy 0.76 254 macro avg 0.76 0.75 0.75 254 weighted avg 0.76 0.76 0.75 254	0.7559	 Confusion Matrix: [[82 36] [26 110]]
K-Nearest Neighbors	 Classification Report: precision recall f1-score support 0 0.66 0.81 0.73 118 1 0.79 0.64 0.71 136 accuracy 0.72 254 macro avg 0.73 0.72 0.72 254 weighted avg 0.73 0.72 0.72 254	0.7165	 Confusion Matrix: [[95 23] [49 87]]

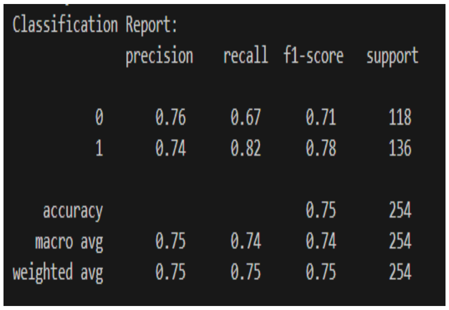
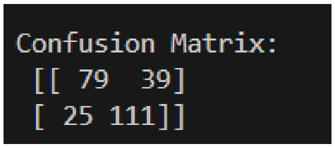
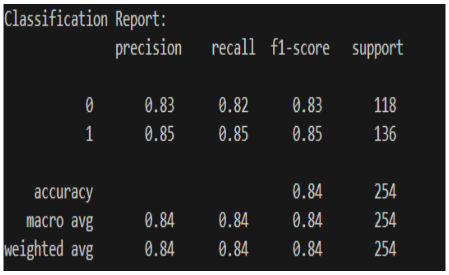
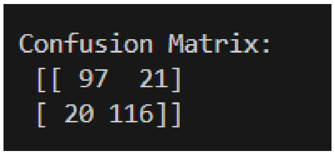
Decision Tree	
	Classification Report:
	              precision recall f1-score support
	
	           0 0.79 0.92 0.85 118
	           1 0.92 0.79 0.85 136
	
	    accuracy 0.85 254
	   macro avg 0.86 0.86 0.85 254
	weighted avg 0.86 0.85 0.85 254
		0.8504	
			Confusion Matrix:
			 [[109 9]
			 [29 107]]

Random Forest	
	Classification Report:
	              precision recall f1-score support
	
	           0 0.91 0.92 0.92 118
	           1 0.93 0.92 0.93 136
	
	    accuracy 0.92 254
	   macro avg 0.92 0.92 0.92 254
	weighted avg 0.92 0.92 0.92 254
		0.9213	
			Confusion Matrix:
			 [[109 9]
			 [11 125]]

Naïve Bayes	
	Classification Report:
	              precision recall f1-score support
	
	           0 0.71 0.68 0.69 118
	           1 0.73 0.76 0.74 136
	
	    accuracy 0.72 254
	   macro avg 0.72 0.72 0.72 254
	weighted avg 0.72 0.72 0.72 254
		0.7205	
			Confusion Matrix:
			 [[80 38]
			 [33 103]]

Support Vector Machines	
	Classification Report:
	              precision recall f1-score support
	
	           0 0.78 0.73 0.75 118
	           1 0.78 0.82 0.80 136
	
	    accuracy 0.78 254
	   macro avg 0.78 0.78 0.78 254
	weighted avg 0.78 0.78 0.78 254
		0.7795	
			Confusion Matrix:
			 [[86 32]
			 [24 112]]

Extreme Gradient Boosting	
	Classification Report:
	              precision recall f1-score support
	
	           0 0.81 0.93 0.87 118
	           1 0.93 0.82 0.87 136
	
	    accuracy 0.87 254
	   macro avg 0.87 0.87 0.87 254
	weighted avg 0.88 0.87 0.87 254
		0.8701	
			Confusion Matrix:
			 [[110 8]
			 [25 111]]

Adaptive Boosting	 Classification Report: precision recall f1-score support 0 0.76 0.67 0.71 118 1 0.74 0.82 0.78 136 accuracy 0.75 254 macro avg 0.75 0.74 0.74 254 weighted avg 0.75 0.75 0.75 254	0.7480	 Confusion Matrix: [[79 39] [25 111]]
Gradient Boosting	 Classification Report: precision recall f1-score support 0 0.83 0.82 0.83 118 1 0.85 0.85 0.85 136 accuracy 0.84 254 macro avg 0.84 0.84 0.84 254 weighted avg 0.84 0.84 0.84 254	0.8386	 Confusion Matrix: [[97 21] [20 116]]