========== Final Results Sorted by Mean Test AUC-PR Score with Std Dev==========

RandomForestClassifier: Mean AUC-PR = 0.9685, Std Dev = 0.0010

XGBClassifier: Mean AUC-PR = 0.9683, Std Dev = 0.0010

LogisticRegression: Mean AUC-PR = 0.9682, Std Dev = 0.0012

KNeighborsClassifier: Mean AUC-PR = 0.9681, Std Dev = 0.0011

========== Final Results Sorted by Mean Test AUC-PR Score with Best AUC-PR ==========

RandomForestClassifier: Mean AUC-PR = 0.9685, Best AUC-PR = 0.9698

XGBClassifier: Mean AUC-PR = 0.9683, Best AUC-PR = 0.9699

LogisticRegression: Mean AUC-PR = 0.9682, Best AUC-PR = 0.9696

KNeighborsClassifier: Mean AUC-PR = 0.9681, Best AUC-PR = 0.9696

========== Best Overall Model ==========

Model: Pipeline(steps=[('preprocessor',

ColumnTransformer(remainder='passthrough',

transformers=[('ord', OrdinalEncoder(),

['Episode\_Number']),

('minmax', MinMaxScaler(),

['Age'])])),

('poly', PolynomialFeatures(include\_bias=False)),

('scaler', StandardScaler()),

('model',

RandomForestClassifier(max\_depth=3, max\_features=0.85))])

Mean AUC-PR Score: 0.9685

Corresponding Random State: 42

--- Running model: LogisticRegression ---

========== Random State: 0 ==========

Performing GridSearchCV...

Best parameters found for Random State 0: {'model\_\_C': 0.1, 'model\_\_l1\_ratio': 0.25, 'model\_\_penalty': 'elasticnet'}

Saved model for LogisticRegression, Random State 1 as LogisticRegression\_1.pkl

Test AUC-PR score for Random State 0: 0.9687

========== Random State: 42 ==========

Performing GridSearchCV...

Best parameters found for Random State 42: {'model\_\_C': 0.1, 'model\_\_l1\_ratio': 0, 'model\_\_penalty': 'elasticnet'}

Saved model for LogisticRegression, Random State 2 as LogisticRegression\_2.pkl

Test AUC-PR score for Random State 42: 0.9696

========== Random State: 84 ==========

Performing GridSearchCV...

Best parameters found for Random State 84: {'model\_\_C': 0.1, 'model\_\_l1\_ratio': 0.25, 'model\_\_penalty': 'elasticnet'}

Saved model for LogisticRegression, Random State 3 as LogisticRegression\_3.pkl

Test AUC-PR score for Random State 84: 0.9661

========== Random State: 126 ==========

Performing GridSearchCV...

Best parameters found for Random State 126: {'model\_\_C': 1.0, 'model\_\_l1\_ratio': 0.5, 'model\_\_penalty': 'elasticnet'}

Saved model for LogisticRegression, Random State 4 as LogisticRegression\_4.pkl

Test AUC-PR score for Random State 126: 0.9684

========== Random State: 168 ==========

Performing GridSearchCV...

Best parameters found for Random State 168: {'model\_\_C': 0.1, 'model\_\_l1\_ratio': 0, 'model\_\_penalty': 'elasticnet'}

Saved model for LogisticRegression, Random State 5 as LogisticRegression\_5.pkl

Test AUC-PR score for Random State 168: 0.9684

========== Summary for Algorithm ==========

Mean Test AUC-PR Score: 0.9682

Best Test AUC-PR Score: 0.9696

Mean Test AUC-PR Score for LogisticRegression: 0.9682

Standard Deviation of Test AUC-PR Score for LogisticRegression: 0.0012

--- Running model: RandomForestClassifier ---

========== Random State: 0 ==========

Performing GridSearchCV...

Best parameters found for Random State 0: {'model\_\_max\_depth': 3, 'model\_\_max\_features': 0.9}

Saved model for RandomForestClassifier, Random State 1 as RandomForestClassifier\_1.pkl

Test AUC-PR score for Random State 0: 0.9691

========== Random State: 42 ==========

Performing GridSearchCV...

Best parameters found for Random State 42: {'model\_\_max\_depth': 3, 'model\_\_max\_features': 0.85}

Saved model for RandomForestClassifier, Random State 2 as RandomForestClassifier\_2.pkl

Test AUC-PR score for Random State 42: 0.9698

========== Random State: 84 ==========

Performing GridSearchCV...

Best parameters found for Random State 84: {'model\_\_max\_depth': 3, 'model\_\_max\_features': 0.8}

Saved model for RandomForestClassifier, Random State 3 as RandomForestClassifier\_3.pkl

Test AUC-PR score for Random State 84: 0.9668

========== Random State: 126 ==========

Performing GridSearchCV...

Best parameters found for Random State 126: {'model\_\_max\_depth': 4, 'model\_\_max\_features': 0.9}

Saved model for RandomForestClassifier, Random State 4 as RandomForestClassifier\_4.pkl

Test AUC-PR score for Random State 126: 0.9683

========== Random State: 168 ==========

Performing GridSearchCV...

Best parameters found for Random State 168: {'model\_\_max\_depth': 3, 'model\_\_max\_features': 0.8}

Saved model for RandomForestClassifier, Random State 5 as RandomForestClassifier\_5.pkl

Test AUC-PR score for Random State 168: 0.9683

========== Summary for Algorithm ==========

Mean Test AUC-PR Score: 0.9685

Best Test AUC-PR Score: 0.9698

Mean Test AUC-PR Score for RandomForestClassifier: 0.9685

Standard Deviation of Test AUC-PR Score for RandomForestClassifier: 0.0010

--- Running model: KNeighborsClassifier ---

========== Random State: 0 ==========

Performing GridSearchCV...

Best parameters found for Random State 0: {'model\_\_metric': 'manhattan', 'model\_\_n\_neighbors': 1500, 'model\_\_weights': 'uniform'}

Saved model for KNeighborsClassifier, Random State 1 as KNeighborsClassifier\_1.pkl

Test AUC-PR score for Random State 0: 0.9684

========== Random State: 42 ==========

Performing GridSearchCV...

Best parameters found for Random State 42: {'model\_\_metric': 'manhattan', 'model\_\_n\_neighbors': 1500, 'model\_\_weights': 'uniform'}

Saved model for KNeighborsClassifier, Random State 2 as KNeighborsClassifier\_2.pkl

Test AUC-PR score for Random State 42: 0.9696

========== Random State: 84 ==========

Performing GridSearchCV...

Best parameters found for Random State 84: {'model\_\_metric': 'euclidean', 'model\_\_n\_neighbors': 1700, 'model\_\_weights': 'uniform'}

Saved model for KNeighborsClassifier, Random State 3 as KNeighborsClassifier\_3.pkl

Test AUC-PR score for Random State 84: 0.9661

========== Random State: 126 ==========

Performing GridSearchCV...

Best parameters found for Random State 126: {'model\_\_metric': 'manhattan', 'model\_\_n\_neighbors': 1700, 'model\_\_weights': 'uniform'}

Saved model for KNeighborsClassifier, Random State 4 as KNeighborsClassifier\_4.pkl

Test AUC-PR score for Random State 126: 0.9678

========== Random State: 168 ==========

Performing GridSearchCV...

Best parameters found for Random State 168: {'model\_\_metric': 'manhattan', 'model\_\_n\_neighbors': 1500, 'model\_\_weights': 'uniform'}

Saved model for KNeighborsClassifier, Random State 5 as KNeighborsClassifier\_5.pkl

Test AUC-PR score for Random State 168: 0.9684

========== Summary for Algorithm ==========

Mean Test AUC-PR Score: 0.9681

Best Test AUC-PR Score: 0.9696

Mean Test AUC-PR Score for KNeighborsClassifier: 0.9681

Standard Deviation of Test AUC-PR Score for KNeighborsClassifier: 0.0011

--- Running model: XGBClassifier ---

========== Random State: 0 ==========

Performing GridSearchCV...

Best parameters found for Random State 0: {'model\_\_max\_depth': 3, 'model\_\_reg\_alpha': 10.0, 'model\_\_reg\_lambda': 10.0}

Saved model for XGBClassifier, Random State 1 as XGBClassifier\_1.pkl

Test AUC-PR score for Random State 0: 0.9685

========== Random State: 42 ==========

Performing GridSearchCV...

Best parameters found for Random State 42: {'model\_\_max\_depth': 3, 'model\_\_reg\_alpha': 10.0, 'model\_\_reg\_lambda': 0.01}

Saved model for XGBClassifier, Random State 2 as XGBClassifier\_2.pkl

Test AUC-PR score for Random State 42: 0.9699

========== Random State: 84 ==========

Performing GridSearchCV...

Best parameters found for Random State 84: {'model\_\_max\_depth': 5, 'model\_\_reg\_alpha': 100.0, 'model\_\_reg\_lambda': 10.0}

Saved model for XGBClassifier, Random State 3 as XGBClassifier\_3.pkl

Test AUC-PR score for Random State 84: 0.9666

========== Random State: 126 ==========

Performing GridSearchCV...

Best parameters found for Random State 126: {'model\_\_max\_depth': 3, 'model\_\_reg\_alpha': 100.0, 'model\_\_reg\_lambda': 0.01}

Saved model for XGBClassifier, Random State 4 as XGBClassifier\_4.pkl

Test AUC-PR score for Random State 126: 0.9681

========== Random State: 168 ==========

Performing GridSearchCV...

Best parameters found for Random State 168: {'model\_\_max\_depth': 3, 'model\_\_reg\_alpha': 100.0, 'model\_\_reg\_lambda': 0.01}

Saved model for XGBClassifier, Random State 5 as XGBClassifier\_5.pkl

Test AUC-PR score for Random State 168: 0.9685

========== Summary for Algorithm ==========

Mean Test AUC-PR Score: 0.9683

Best Test AUC-PR Score: 0.9699

Mean Test AUC-PR Score for XGBClassifier: 0.9683

Standard Deviation of Test AUC-PR Score for XGBClassifier: 0.0010

Saved best overall model as best\_model\_overall.pkl