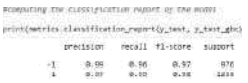
Project Development Phase
Model Performance Test

| | |
|---|---|
| Date | 16 November 2022 |
| Team ID | PNT2022TMID49894 |
| Project Name | Project — Web Phishing Detection |
| Maximum Marks | 10 Marks |

Model Performance Testing:

Project team shall fill the following information in model performance testing template.

| S.No. | Parameter | **Values** | Screenshot |
|---|---|---|---|
| 1. | Metrics | Classification Model:<br>G o **ting 4%ssification**<br>A dea Sco |  |
| 2. | Tune the Model | Hyperparameter Tuning - 97%<br>Validation Method — KFOLD &<br>Cross Validation Method |  |

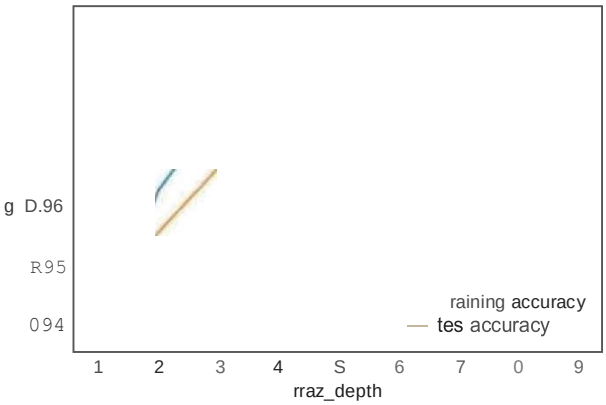
1. METRICS:
CLASSIFICATION REPORT:

```
In [52]: #computing the classification report of the model

         p+  nt(metrics.classification_report(y_test, y_test_gbc))
```

| | precision | nacal1 | +1-score | support |
|---|---|---|---|---|
| −1 | 0..°s | e. 6 | e..°7 | .76 |
| 1 | g . 97 | 0 . 99 | 0 . 96 | 1235 |
| accurac;' | | | 0.97 | J2 1 1 |
| macro avg | .0 8 | 8.°7 | 0.97 | 221 1 |
| weighted avg | 9. 97 | 0.°7 | 0 . 97 | 221 1 |

PERFORMANCE :




| | ML *Moâet* | Accuracy | fJ_score | Recall | Precision |
|---|---|---|---|---|---|
| 0 | Cradient Boosting C tassifier | 0.974 | 0.977 | 0.994 | 0.986 |
| 1 | CatBoost Classified | 0.972 | 0.975 | 0.994 | 0.989 |
| 2 | Random Forest | 0.96• | 0.972 | 0.992 | 0.991 |
| 3 | Support Vector Machine | 0.964 | 0.968 | 0.980 | 0.96S |
| 4 | Decision Tree | 0.938 | 0.962 | 0.991 | 0.993 |
| 5 | K-Nearest Neighbors | 0.956 | 0.9fi1 | 0.991 | 0.989 |
| 6 | Log stic Regression | 0.934 | 0.941 | 0.943 | 0.927 |
| 7 | Naive Bayes ClaSsifier | 0.605 | 0.454 | 0.292 | 0.997 |
| 8 | XGBoonCla§fiKer | 0.548 | 0.348 | 0.993 | 0.984 |
| 9 | Mufti-layer Perceptron | 0.543 | 0.543 | 0.989 | 0.983 |

## 2. TUNE THE MODEL - HYPERPARAMETER TUNING

```
In [58]: #HYPERPARAMETER TUNING
         grid.fit(X_train, y_train)
```

GridSearchCV

```
GridSearchCV(cv=5,
             estimator=GradientBoostingClassifier(learning_rate=0.7,
                                                  max_depth=4),
```

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GradientBoostingClassifier(learning_rate=0.7, max_depth=4)

GradientBoostingClassifier

GradientBoostingClassifier(learning_rate=0.7, max_depth=4)

```
In [59]: print("The best parameters are %s with a score of %0.2f"
               \ (grid.òest pants , grid.lest sroee_} )
```

```
The best parameters are {'max_features': 5, 'n_estimators': 200} with a score of 0.97
```

# VALIDATION METHODS: KFOLD & Cross Folding

## Wllexon signed-rank test

```
In [7°]: #KFOLD and Cross Validation Model

         from sclpy.stats font »11coxon
         fno+ sk1earn.datasets b«po• t 1oad_1r1s
         +mm sk1earn.ense«tb1e Vapor-t GradlentBoest1ngC1ass1f1er
         from xgboost io}zort XGBC1ass:tf1er
         +n    sklearn.«odc1_se1ectSon Prepaid cross_va1_scorc, Krold

         4 Load th.e doTcse I
         X = 1oad_1r1s().data
         y = 1oad_1rds().target

         # Prepare models and select your CV method
         modell = GradientBoostingClassifier(n_esticators=100)
         mWel2 = XG8Clssifier(n_estinators=1   )
         kf  = KFol d(n_sp1l ts =Z0,  randoni_state-None)
        4 Ex.W acI resuILe for each .'nodes or'. the sa.   foL d
         result s_nlodell - cross_va1_score(r«ode11, X, y, cv=kf)
         resu1ts_«tocle12 = cross_va1_score(«ode12, X, y, cv=kf)
         stat. p = w11coxon(resu1ts_m>de11, results_eode12, zero_eethod= 'zsp1it'),
         stat
```

## 5z2CV combined F test

```
In [89]: frcm o1xtend.eva1uate 1mpoi-I ccmb1ned_ftest_5x2cv
         fr"oo sk1corn.tree Import Dec1slonTreeC1ossTfler, ExtretreeCiassi-tSer
         from sk1earn.ensetrb1e import GradlentBoost1ngC1asstf1er
         frmi u1xtend.data 1npoi-t 1r1s_data

         * P. epa. e fiiata or.d cI.fis
         X, y = 1r1s_data()
         clll  = Grad1ent8oostlngC1assLiber ( )
         c1f2 = DeclsionTreeC1ass11°1er ()

         # Calculate p-value
         f, p = combined_ftest_5x2cv(estimator1=clf1,
                                     estimator2=clf2,
                                     X=X, y=y,
                                     random_seed=1)

         print('I -va 1ue-  ', I )
         pr int ( p-va Ke :', p)

         f-va1ue: 1.727272727272733
         p-ve1ue: 6.2B40'135734291782
```