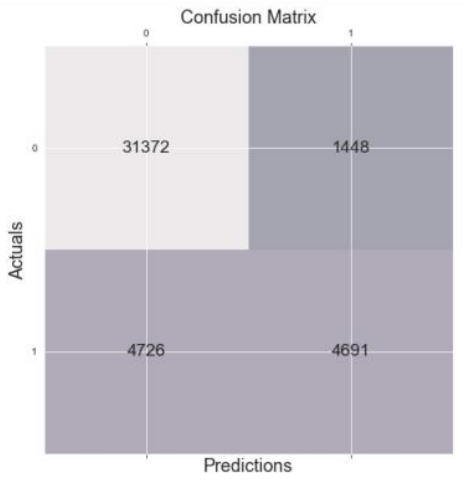
Project Development Phase
Model Performance Test

Date	10 November 2022
Team ID	PNT2022TMID16670
Project Name	Exploratory Analysis of Rainfall Data in India for Agriculture
Maximum Marks	10 Marks

Model Performance Testing:

S.No.	Parameter	Values	Screenshot
1.	Metrics	**Classification Model: Random Forest** **Confusion Matrix –** [[31372 1448] [4726 4691]] **Accuracy Score-** 0.8538248455145963 **Classification Report –** Accuracy: 0.8538248455145963 Precision: 0.7641309659553673 Recall: 0.49814165870234683 F1-score: 0.6031113396760092	**Random forest Confusion matrix** `conf_matrix = metrics.confusion_matrix(y_test,t1)` `fig,ax = plt.subplots(figsize=(7.5,7.5))` `ax.matshow(conf_matrix,alpha=0.3)` `for i in range(conf_matrix.shape[0]):` `for j in range(conf_matrix.shape[1]):` `ax.text(x=j, y=i, s=conf_matrix[i,j], va ='center', ha='center',size='xx-larg` `plt.xlabel('Predictions',fontsize=18)` `plt.ylabel('Actuals',fontsize=18)` `plt.title('Confusion Matrix',fontsize=18)` `plt.show()`  `t1 = Rand_forest.predict(X_test_scaled)` `print("Rand_forest:",metrics.accuracy_score(y_test,t1))` `Rand_forest: 0.8538248455145963`

			`` print("*"*10, "Classification Report", "*"*10) print("-"*30) print(classification_report(y_test, t1)) print("-"*30) ``` ``` ********** Classification Report ********** ------------------------------ precision recall f1-score support 0 0.87 0.96 0.91 32820 1 0.76 0.50 0.60 9417 accuracy 0.85 42237 macro avg 0.82 0.73 0.76 42237 weighted avg 0.85 0.85 0.84 42237 ------------------------------ ```
2.	Tune the Model	Hyperparameter Tuning & Validation Method - RandomizedSearchCV	**Hyperparameter Tuning** ``` from sklearn.ensemble import RandomForestRegressor rf = RandomForestRegressor(random_state = 42) from pprint import pprint # Look at parameters used by our current forest print('Parameters currently in use:\n') pprint(rf.get_params()) ``` ``` Parameters currently in use: {'bootstrap': True, 'ccp_alpha': 0.0, 'criterion': 'mse', 'max_depth': None, 'max_features': 'auto', 'max_leaf_nodes': None, 'max_samples': None, 'min_impurity_decrease': 0.0, 'min_impurity_split': None, 'min_samples_leaf': 1, 'min_samples_split': 2, 'min_weight_fraction_leaf': 0.0, 'n_estimators': 100, 'n_jobs': None, 'oob_score': False, 'random_state': 42, 'verbose': 0, 'warm_start': False} ```

```
n_estimators = [10,20,30,50]
max_features = ['auto', 'sqrt']
max_depth = [int(x) for x in np.linspace(10, 50, num = 8)]
min_samples_split = [4, 8, 10]
min_samples_leaf = [2, 4, 6]
bootstrap = [True, False]
# Create the random grid
random_grid = {'n_estimators': n_estimators,
               'max_features': max_features,
               'max_depth': max_depth,
               'min_samples_split': min_samples_split,
               'min_samples_leaf': min_samples_leaf,
               'bootstrap': bootstrap}
```

```
from sklearn.model_selection import RandomizedSearchCV
rf = RandomForestRegressor()
rf_random = RandomizedSearchCV(estimator = rf,param_distributions = random_grid,r
```

```
rf_random.fit(X_train_scaled, y_train)
```

```
Fitting 5 folds for each of 100 candidates, totalling 500 fits

RandomizedSearchCV(cv=5, estimator=RandomForestRegressor(), n_iter=100,
                   n_jobs=-1,
                   param_distributions={'bootstrap': [True, False],
                                        'max_depth': [10, 15, 21, 27, 32, 38,
                                                      44, 50],
                                        'max_features': ['auto', 'sqrt'],
                                        'min_samples_leaf': [2, 4, 6],
                                        'min_samples_split': [4, 8, 10],
                                        'n_estimators': [10, 20, 30, 50]},
                   random_state=35, verbose=2)
```

```
best_params = rf_random.best_params_
```

```
print ('Best Parameters is', best_params)
```

```
Best Parameters is {'n_estimators': 50, 'min_samples_split': 10, 'min_samples_l
eaf': 6, 'max_features': 'sqrt', 'max_depth': 21, 'bootstrap': False}
```

```
print(f'Accuracy =: {round(rf_random.score(X_train_scaled, y_train) * 100, 2)}%')
```

```
Accuracy =: 75.07%
```