FERTILIZER PREDICTION

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Introduction

- In Agriculture,the judicious use of fertilizers plays a pivot role in ensuring optimal crop growth and yield. However,determining the right type for a particular crop and soil condition can be complex.
- Machine learning techniques offer promising solutions to this challenge by leveraging historical data on soil properties,rainfall and temperature usage to develop predictive models.

Problem Statement

- The project focuses on predicting the most suitable type of fertilizer for different soil conditions,rainfall and temperature.
- The problem is framed to predict a correct type of fertilizer based on various features.

Dataset Description

- The Dataset includes information such as soil conditions,rainfall and temperature.
- Key features include soil color, Nitrogen, Phosphorus, Potassium, pH, Rainfall and Temperature.
- The target variable is the type of fertilizer used based on given features.

Model Building

Three classification models have been implemented in the project:

- Support Vector Machine
- KNN Classifier
- Decision Tree Classifier
- Random Forest Classifier

Evaluation Metrics

The performance of the models is assessed using common classification metrics:

- Accuracy
- Precision
- Recall
- F1 Score

Deployment

- Framework : gradio
- Programming Language: Python
- Version Control : Git hub

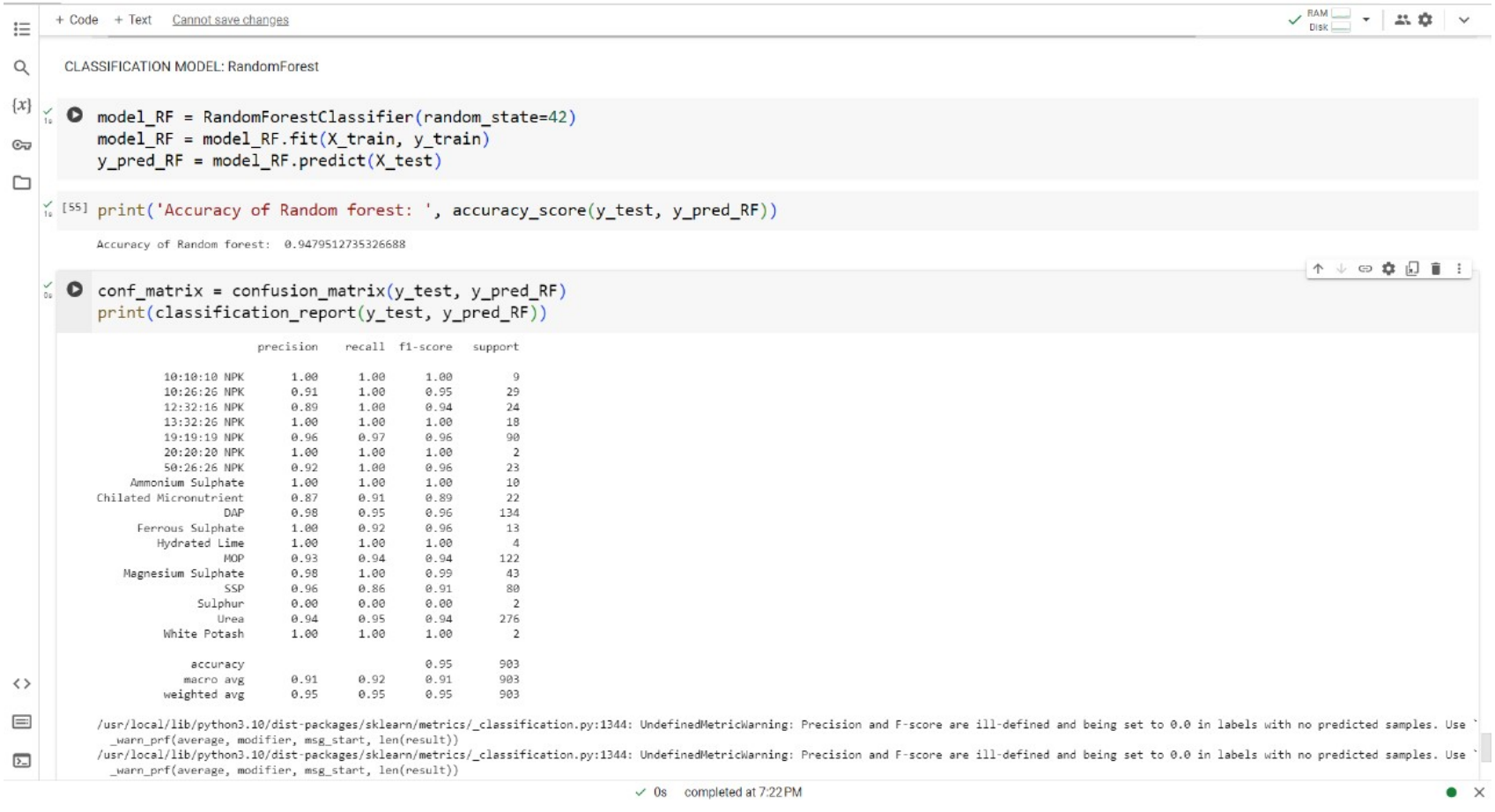
Accuracy Results

Table 1: **Models with Accuracy**

Model	**Accuracy**
Support Vector Machine	0.45293
KNN Classifier	0.68106
Decision Tree Classifier	0.94684
RandomForest Classifier	0.94795

- Selected Model : RandomForest Classifier

Random Forest Classifier Accuracy



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CLASSIFICATION MODEL: RandomForest

```
model_RF = RandomForestClassifier(random_state=42)
model_RF = model_RF.fit(X_train, y_train)
y_pred_RF = model_RF.predict(X_test)
```

```
[55] print('Accuracy of Random forest: ', accuracy_score(y_test, y_pred_RF))
```

```
Accuracy of Random forest:  0.9479512735326688
```

```
conf_matrix = confusion_matrix(y_test, y_pred_RF)
print(classification_report(y_test, y_pred_RF))
```

```
                         precision    recall  f1-score   support

          10:10:10 NPK       1.00      1.00      1.00         9
          10:26:26 NPK       0.91      1.00      0.95        29
          12:32:16 NPK       0.89      1.00      0.94        24
          13:32:26 NPK       1.00      1.00      1.00        18
          19:19:19 NPK       0.96      0.97      0.96        90
          20:20:20 NPK       1.00      1.00      1.00         2
          50:26:26 NPK       0.92      1.00      0.96        23
      Ammonium Sulphate      1.00      1.00      1.00        10
Chilated Micronutrient       0.87      0.91      0.89        22
                   DAP       0.98      0.95      0.96       134
       Ferrous Sulphate      1.00      0.92      0.96        13
          Hydrated Lime      1.00      1.00      1.00         4
                    MOP       0.93      0.94      0.94       122
    Magnesium Sulphate      0.98      1.00      0.99        43
                    SSP       0.96      0.86      0.91        80
               Sulphur        0.00      0.00      0.00         2
                  Urea        0.94      0.95      0.94       276
          White Potash       1.00      1.00      1.00         2

              accuracy                           0.95       903
             macro avg       0.91      0.92      0.91       903
          weighted avg       0.95      0.95      0.95       903

/usr/local/lib/python3.10/dist-packages/sklearn/metrics/_classification.py:1344: UndefinedMetricWarning: Precision and F-score are ill-defined and being set to 0.0 in labels with no predicted samples. Use `
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.10/dist-packages/sklearn/metrics/_classification.py:1344: UndefinedMetricWarning: Precision and F-score are ill-defined and being set to 0.0 in labels with no predicted samples. Use `
  _warn_prf(average, modifier, msg_start, len(result))
```

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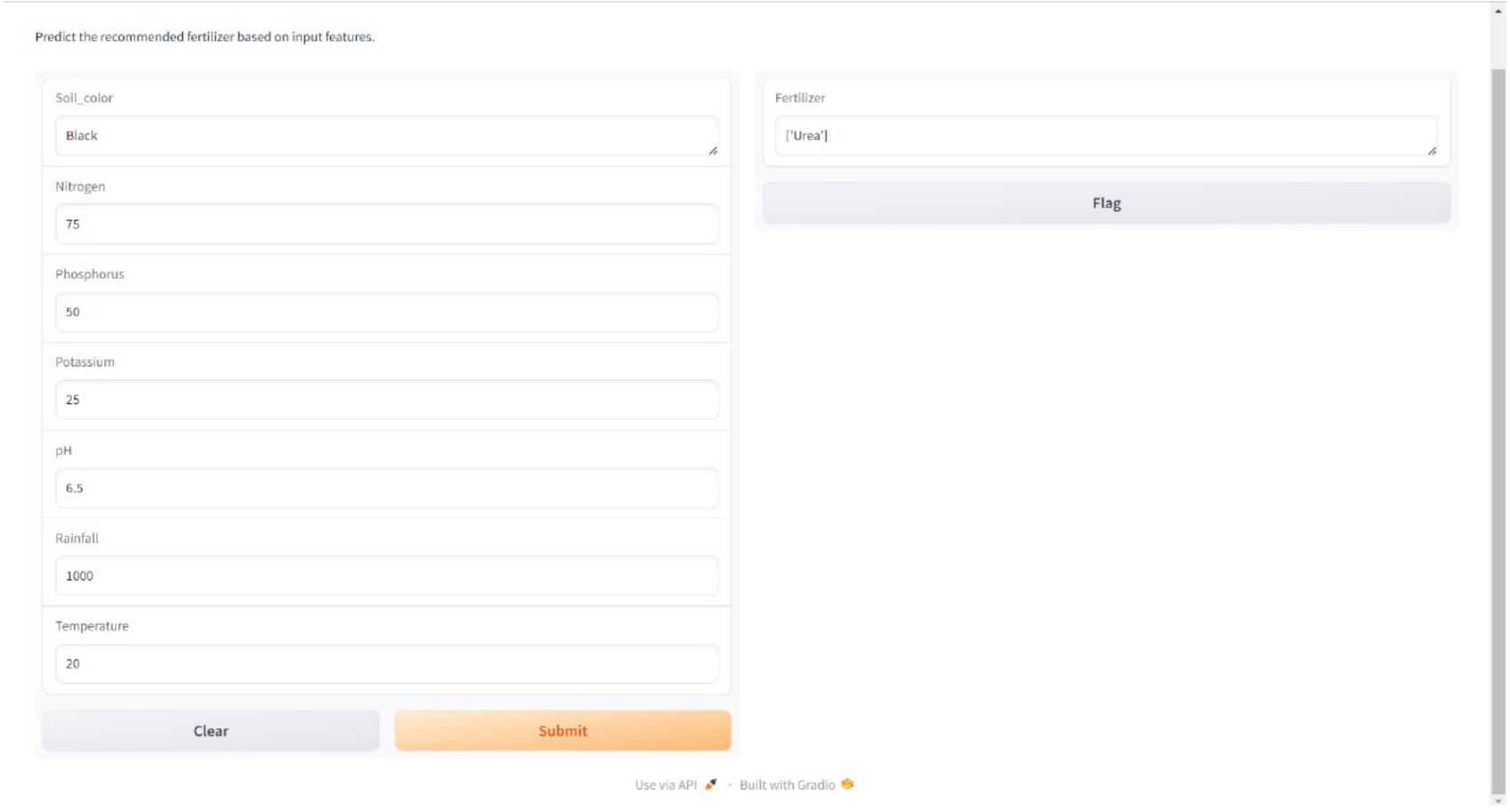
Result


Predict the recommended fertilizer based on input features.
Soil_color
Black
Nitrogen
75
Phosphorus
50
Potassium
25
pH
6.5
Rainfall
1000
Temperature
20
Clear
Submit
Fertilizer
['Urea']
Flag
Use via API
Built with Gradio

Thank You