Crop Recommendation System

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PROBLEM STATEMENT

Challenge

The selection of suitable crops for cultivation heavily depends on various environmental factors such as soil composition, climate conditions and geographical location.

There is a need to develop a data-driven approach that utilizes machine learning techniques to recommend the most suitable crops based on key environmental parameters.

Objective

The primary objective of this project is to design and implement a crop recommendation system that takes into account factors such as soil nutrient levels (potassium, phosphorus, nitrogen), humidity, rainfall, and temperature to suggest the most appropriate crops for cultivation in a given area.

APPROACH

- Data Collection: Gathering the Agricultural data.
- Data Preprocessing: Cleaning and normalizing the data.
- Feature Selection: Identifying the important features.
- Model Selection: Choosing a Machine Learning Algorithm.
- Model Training: Training the selected model.
- Model Evaluation: Evaluating the performance of the trained model.
- Deployment: Integrating it into a user-friendly interface.
- Monitoring and Maintenance: Regularly update and maintain the model.

MODEL SELECTION

```
/usr/local/lib/python3.10/dist-packages/sklearn/linear_model/_logistic.py:469: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
  n_iter_i = _check_optimize_result(
Logistic Regression with accuracy: 0.9454545454545454
Naive Bayes with accuracy: 0.9954545454545455
Support Vector Machine with accuracy: 0.9613636363636363
K-Nearest Neighbors with accuracy: 0.9704545454545455
Decision Tree with accuracy: 0.9818181818181818
Random Forest with accuracy: 0.9931818181818182
Bagging with accuracy: 0.9886363636363636
/usr/local/lib/python3.10/dist-packages/sklearn/ensemble/_weight_boosting.py:519: FutureWarning: The SAMME.R algorithm (the default) is deprecated and will be removed in
  warnings.warn(
AdaBoost with accuracy: 0.09545454545454546
Gradient Boosting with accuracy: 0.9818181818181818
Extra Trees with accuracy: 0.925
```

CHALLENGES

- Data Quality and Availability
- Feature Engineering
- Model Complexity and Interpretability
- Model Generalization
- Domain Expertise
- Data Privacy and Security
- Scalability and Sustainability

LEARNINGS

- Importance of Agricultural Data: Recognizing the significance of agricultural data in building effective recommendation systems.
- Machine Learning Techniques: Understanding various machine learning algorithms and their applicability to crop recommendation.
- Data Preprocessing: Learning techniques for cleaning, preprocessing, and preparing agricultural data for analysis.
- Model Evaluation: Exploring methods for evaluating the performance of crop recommendation models.
- Real-world Applications: Gaining insights into the practical applications and impact of crop recommendation systems in agriculture.

TOOLS AND TECHNOLOGIES

Tools used:

- Google Colab
- Jupyter NoteBook
- Anaconda
- Pycharm

Technologies:

- Machine Learning
- Python
- HTML

PROGRAM OUTPUT

Crop Recommendation System

Nitrogen (N)
60

Phosphorus (P)
50

Potassium (K)
10

Temperature (°C)
22

Humidity (%)
100

pH
6.56

Rainfall (mm)
87.75

Get Recommendation

Recommended Crop:

OUTPUT

Crop Recommendation System

Nitrogen (N)
60

Phosphorus (P)
50

Potassium (K)
10

Temperature (°C)
22

Humidity (%)
100

pH
6.56

Rainfall (mm)
87.75

Get Recommendation

Recommended Crop: Muskmelon is the best crop to be cultivated right there

CONCLUSION

- The development of a crop recommendation system based on soil nutrient levels and environmental factors represents a promising endeavor with the potential to revolutionize agricultural decision-making.

BIBLIOGRAPHY

- Project selected-From google
- Dataset-From Kaggle
- Model - ChatGpt,Smart Ai Technologies(yt for model selection)