NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

Department of Computer Science and Engineering

Farming Made Easy Using Machine Learning

PRESENTED BY

Potturi Lahari	(20471A05M3)
Gogineni Saikalpana	(20471A05K8)
Shaik Nabi Wajiha	(20471A05N0)
Chennakesavula Krishna Sai Sreeja	(20471A05N8)

Under the Guidance of,

M.Venkata Rao M.Tech,
Asst.Professor,

Department of Computer Science and Engineering,

Narasaraopeta Engineering College (Autonomous),

Narasaraopet- 522 601.

OUTLINE

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ABSTRACT

Agriculture, crucial for our economy, faces challenges from climate changes and price fluctuations, causing farmers significant losses. To combat this, a system employs Decision Tree Regression for precise crop price prediction. This provides farmers with accurate price forecasts, aiding decision-making and profitability. The system also offers weather forecasts, crop recommendations, a shop, and guide features. It maximizes yield by suggesting suitable crop types and aids in resource planning through crop yield prediction.

INTRODUCTION

Agriculture, crucial to our economy, faces challenges from unpredictable climate patterns and volatile price trends, leading to crop spoilage and financial losses for farmers. To address this, we've developed an inclusive system utilizing Machine Learning's Decision Tree & Random Forest Algorithms for accurate crop price predictions. By offering advanced forecasts, our system empowers farmers to make informed decisions, improving profitability. Additionally, it includes weather forecasts, crop and fertilizer recommendations, shopping, chatting, and guidance features, serving as a valuable tool for farmers to optimize practices and profitability.

LITERATURE SURVEY

No	Title	Author	Journal Name & Year	Methodology Adapted	Key Findings	Gaps
1	Machine learning for large-scale crop yield forecasting	D. Paudel, H. Boogaard, A. de Wit, S. Janssen, S. Osinga, C. Pylianidis, et al.	Agricultural Systems, vol. 187, pp. 103016, 2021	Machine Learning	Large-scale Crop Yield Forecasting	Algorithms vary in applicability.
2	Crop Price Prediction and Forecasting System using Supervised Machine Learning Algorithms	Rohith R, Vishnu R, Kishore A, Deeban Chakkarawarthi	International Journal of Advanced Research in Computer and Communication Engineering, March 2020	Supervised Machine Learning Algorithms	Crop Price Prediction and Forecasting System	Comparison of supervised ML accuracy inadequate.
3	Soil Analysis for Suitable Crop Prediction using Machine Learning and Image Processing	Vishal Kumar, Raushan Kumar, Shubham Kumar, Ajinkya	Proceedings of International Journal of Advanced Research in Science Communication and Technology, vol. 4, no. 2, pp. 2581-9429, April 2021	Machine Learning Algorithms	Soil Analysis for Crop Prediction	Lack of detailed exploration on the integration of processing with machine learning for soil analysis and crop prediction.

LITERATURE SURVEY

No	Title	Author	Journal Name & Year	Methodology Adapted	Key Findings	Gaps
4	Prediction of Soil Fertility Using ML Algorithms and Fertilizer Recommendation System	R. Madhumathi, R.Dhanishtaa, E Elakkiya.	IEEE&2023	Machine Learning	Calcium,Soil properties	neglecting the inclusion of other crucial soil nutrients essential for optimal plant growth and yield
5	Farming Made Easy using Machine Learning	Manasi Jadhav' Neha Kolambe, Shreya Jain	2021 2nd International Conference for Emerging Technology (INCET) Belgaum, India.	Machine Learning, decision tree regression	agriculture, decision tree regression, price prediction, weather forecast, fertilizer	Less focus on comprehensive crop disease management.

RESEARCH GAPS

- Enhance interpretability of machine learning models in agriculture to aid farmers' understanding.
- Develop adaptable technologies suitable for various farm sizes and regions.
- Prioritize cost-effective solutions delivering tangible benefits to farmers.

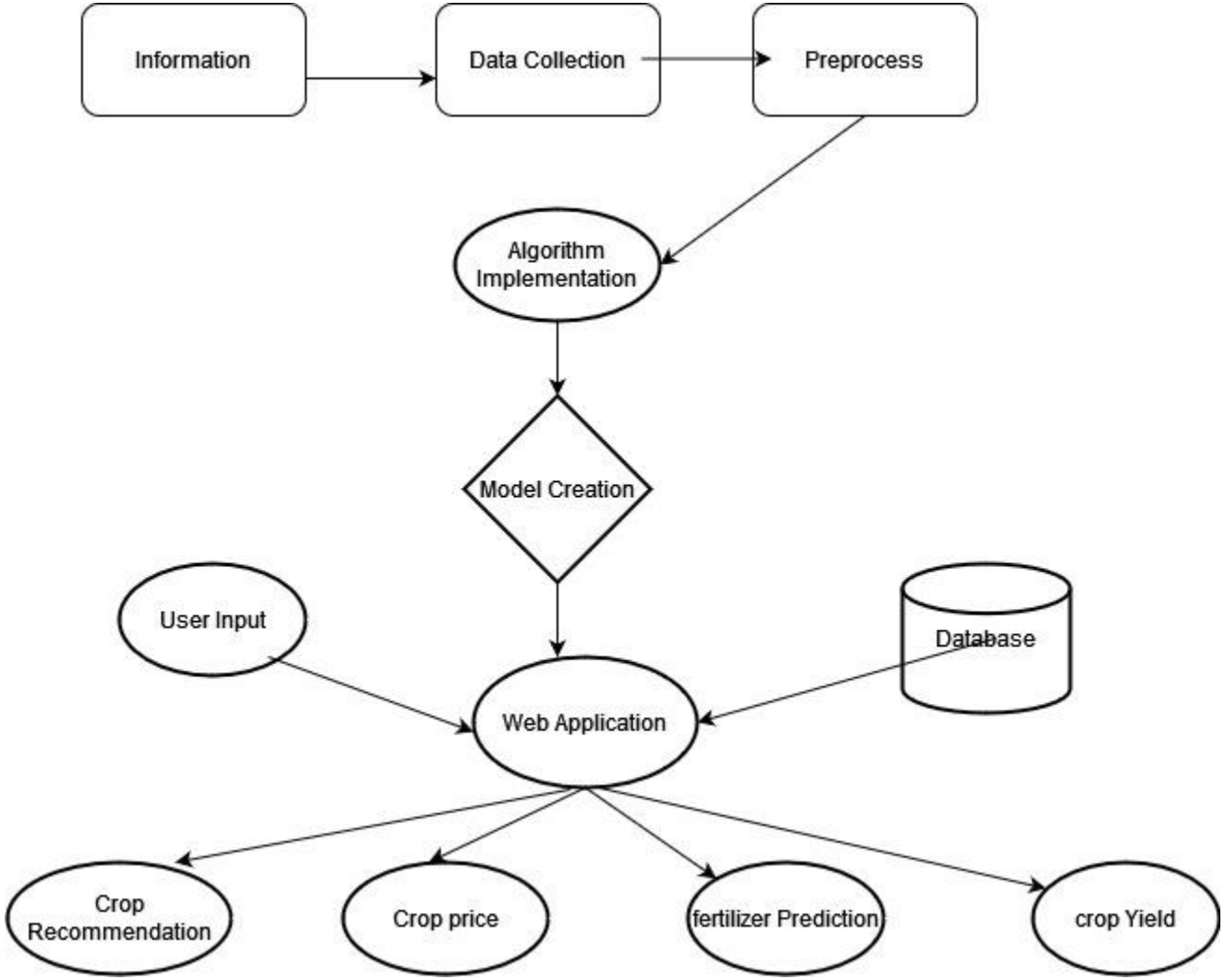
PROBLEM STATEMENT

1. Agriculture faces significant challenges due to unpredictable climate patterns and price fluctuations, leading to financial losses for farmers.
2. Farmers lack accurate and timely information to make informed decisions regarding crop management and resource allocation.
3. Existing systems for crop price prediction may lack accuracy and reliability, hindering farmers' ability to plan effectively.
4. There is a need for integrated solutions that provide comprehensive support to farmers, including weather forecasts, crop recommendations, and yield predictions.
5. The agricultural sector requires innovative technologies like Machine Learning to revolutionize farming practices and drive economic growth sustainably.

OBJECTIVES

1. Empower farmers with advanced price forecasts to facilitate informed decision-making and increase profitability.
2. Provide weather forecasts, crop, and fertilizer recommendations, as well as a shop, chat portal, and guide features to support farmers comprehensively.
3. Enhance crop yield through the crop recommendation module, maximizing agricultural output and resource efficiency.
4. Optimize crop growth and quality by utilizing the fertilizer recommendation module, aiming to improve overall agricultural practices and profitability.

BLOCK DIAGRAM OR FLOW DIAGRAM



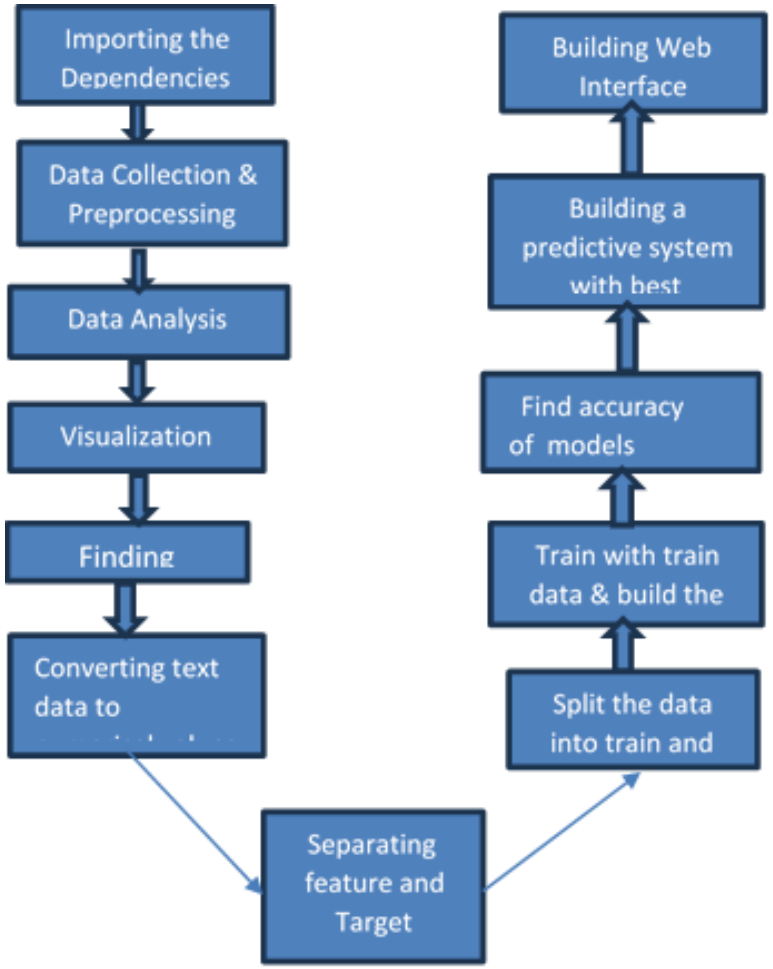
METHODOLOGY

Preprocessing Techniques:

- Null value removal
- Label Encoder
- Data Analysis

Algorithms:

- Random Forest
- Decision Tree
- Lasso
- Ridge
- Linear Regression
- KNN



SYSTEM REQURIMENTS

Hardware Requirements

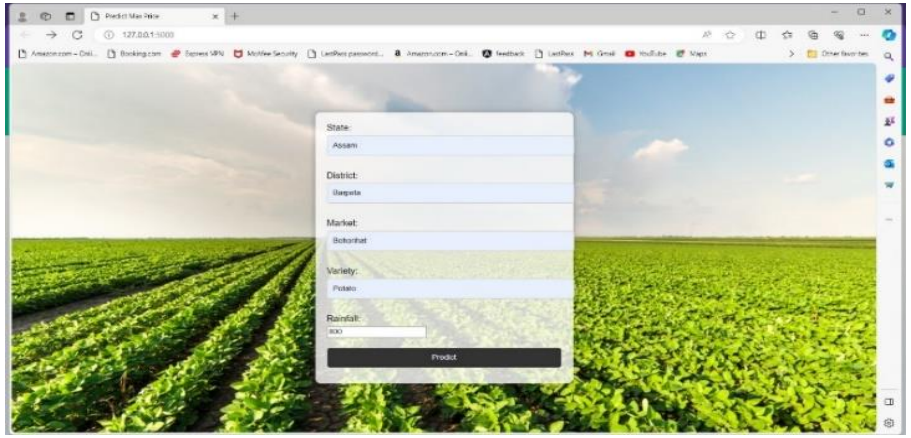
- Processor : intel®corEi5
- Cache memory : 4 MB
- System type : 64-bit operating system, x64-based processor
- RAM : 8 GB

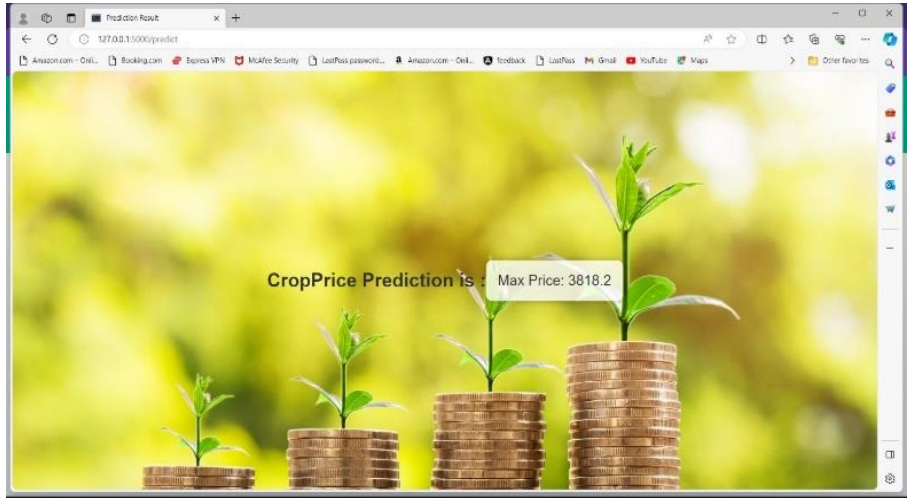
Software Requirements

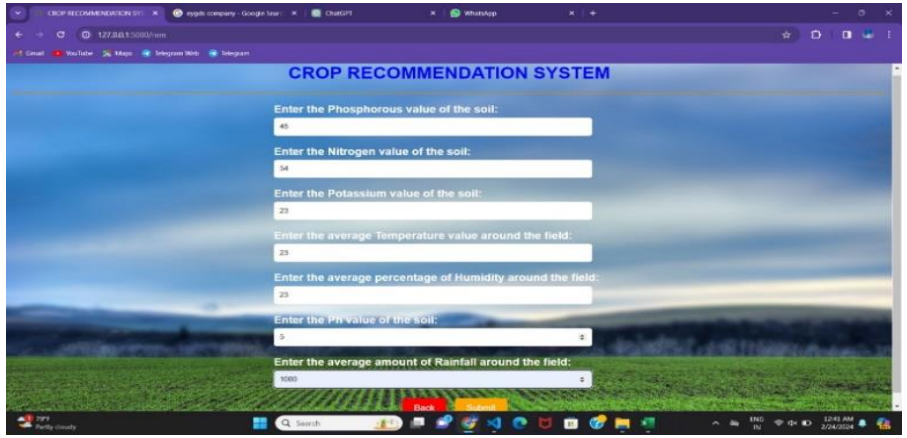
- Operating system : windows-10, 64 bit OS
- Coding language : Python
- Python distribution : VS Code
- Browser : Any Latest Browser like Chrome

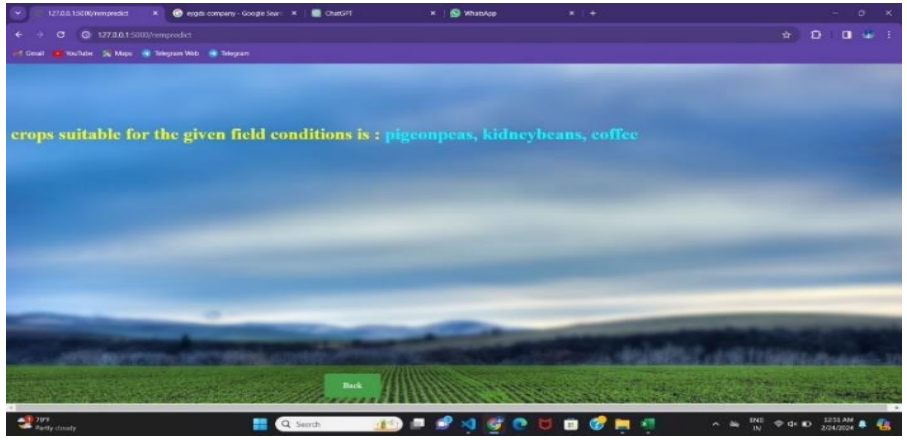
.

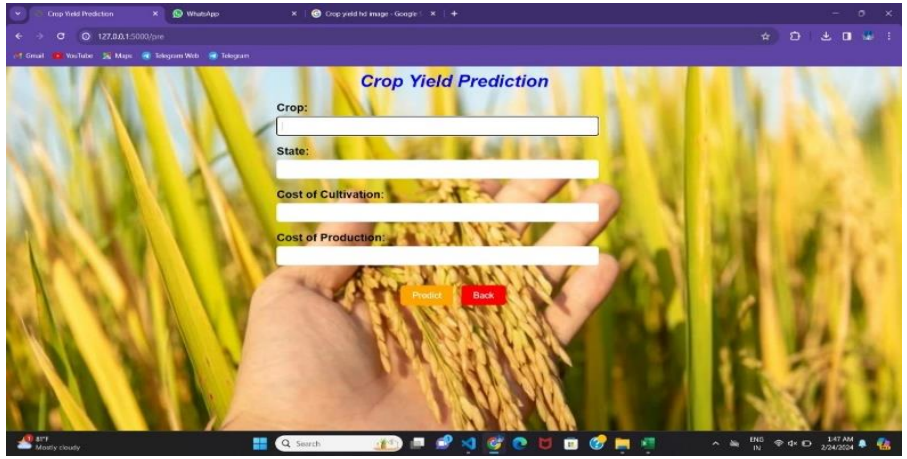
RESULT & ANALYSIS

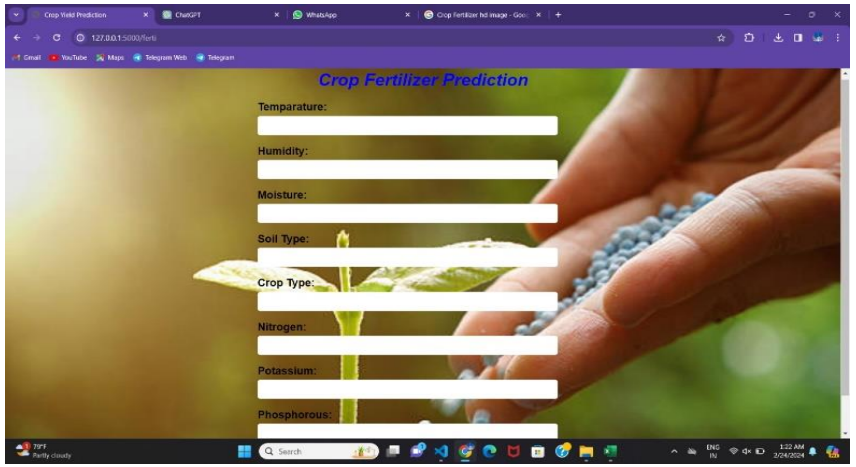


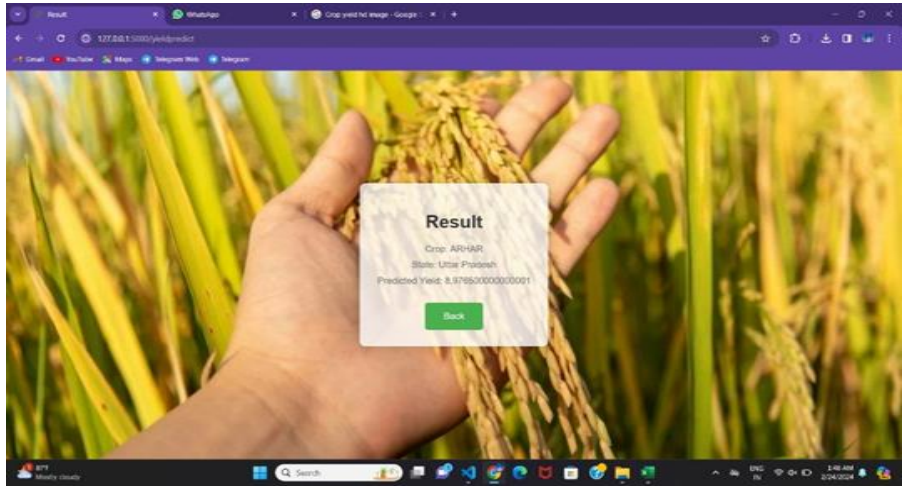


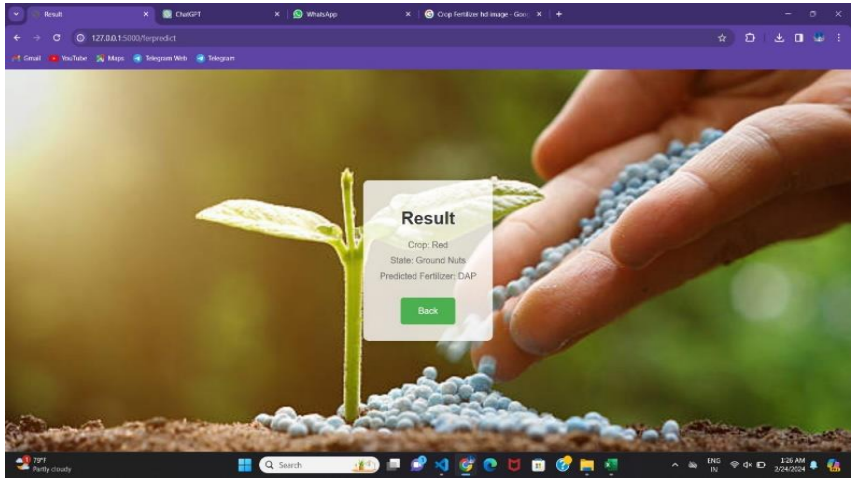




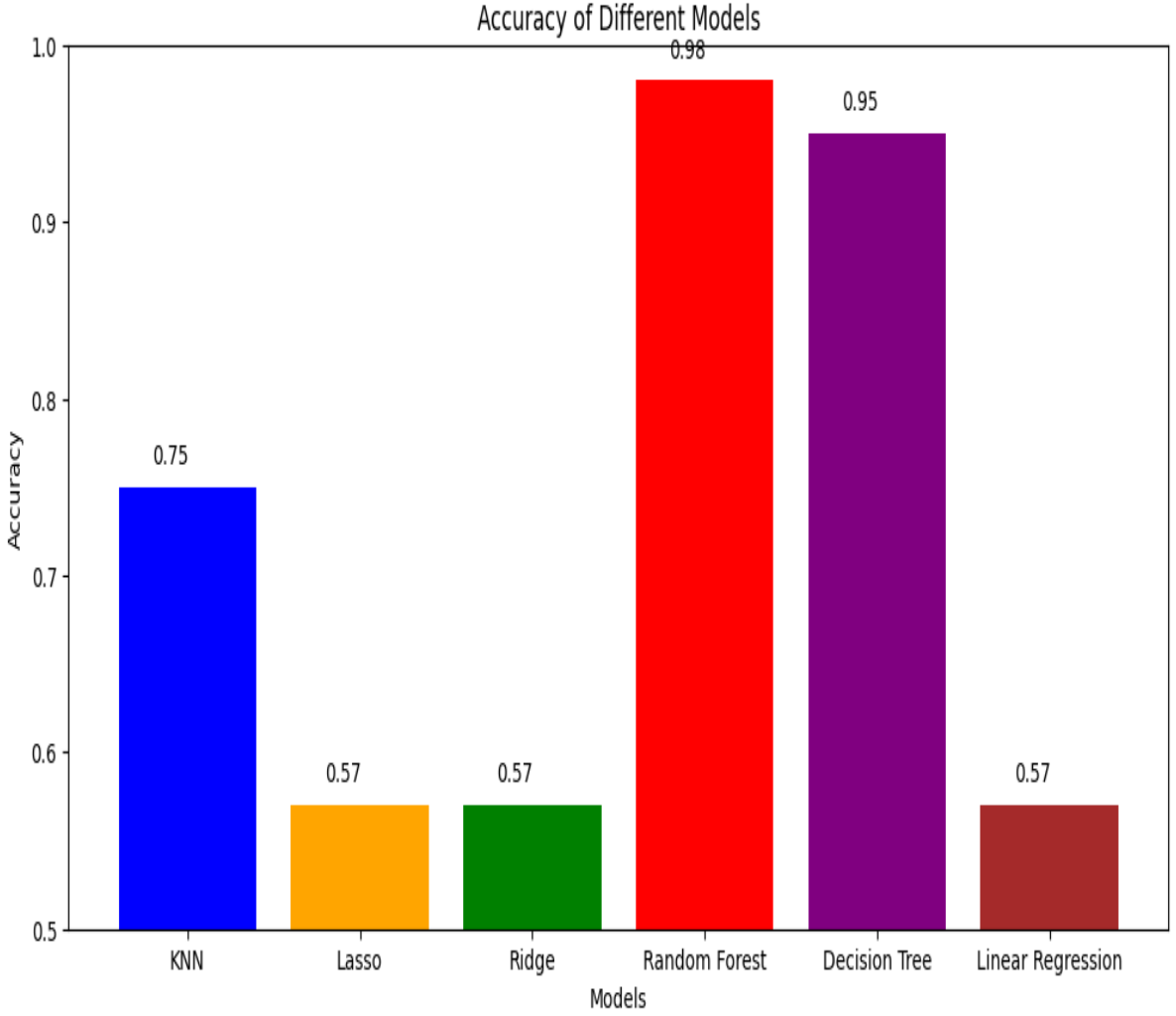

Crop Yield Prediction
Crop:
State:
Cost of Cultivation:
Cost of Production:
Predict
Back

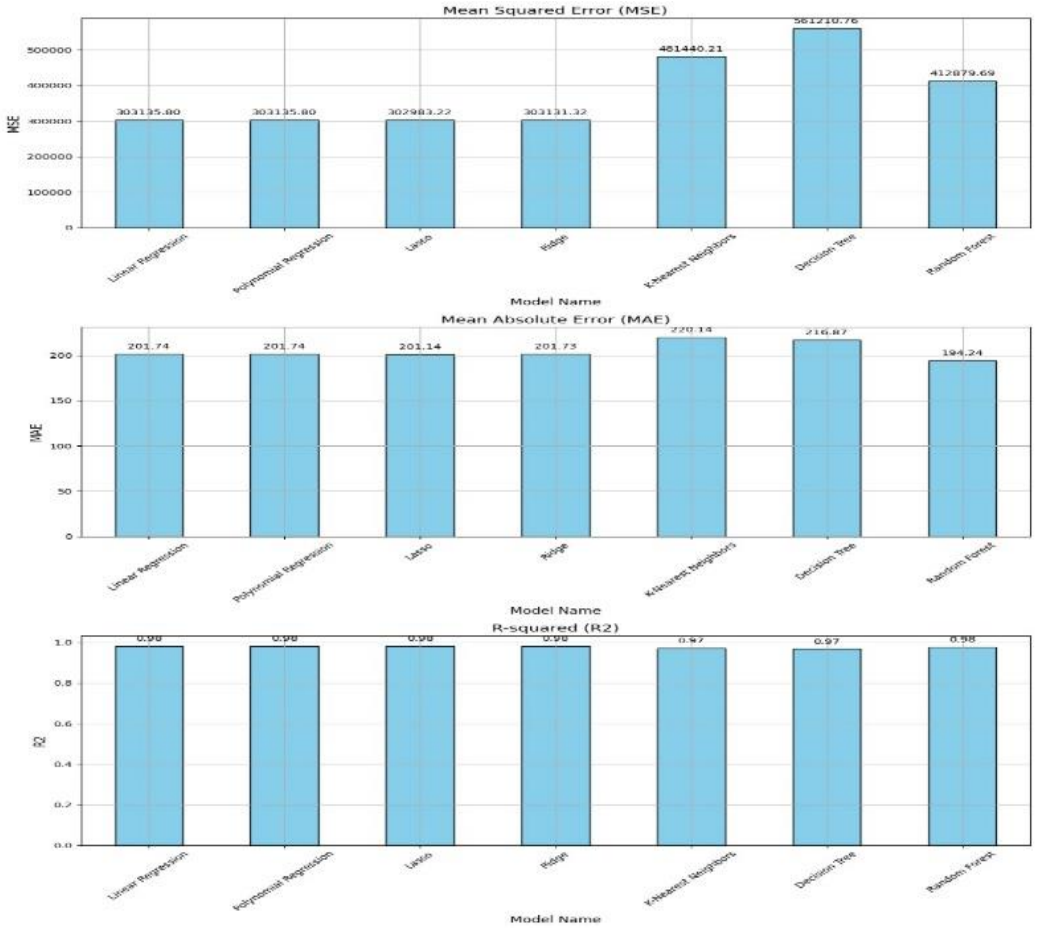

Crop Fertilizer Prediction
Temparature:
Humidity:
Moisture:
Soil Type:
Crop Type:
Nitrogen:
Potassium:
Phosphorous:


Result
Crop: ARHAR
State: Uttar Pradesh
Back


Result
Crop: Red
State: Ground Nuts
Predicted Fertilizer: DAP
Back

ANALYSIS


Accuracy of Different Models
Accuracy
Models
KNN
Lasso
Ridge
Random Forest
Decision Tree
Linear Regression
0.75
0.57
0.57
0.98
0.95
0.57


Mean Squared Error (MSE)
MSE
303135.80
303135.80
302983.22
303131.32
481440.21
561210.76
412879.69
Mean Absolute Error (MAE)
MAE
201.74
201.74
201.14
201.73
220.14
216.87
194.24
R-squared (R2)
R2
0.98
0.98
0.98
0.98
0.97
0.97
0.98
Linear Regression
Polynomial Regression
Lasso
Ridge
K-Nearest Neighbors
Decision Tree
Random Forest
Model Name

CONCULSION &FUTURE SCOPE

The project extensively utilized machine learning algorithms, particularly Random Forest, to revolutionize agricultural practices. Random Forest emerged as the most effective algorithm, achieving a remarkable 98% accuracy rate in predicting crop yields. Beyond yield prediction, machine learning models were applied to forecast crop prices, recommend suitable crops, and determine optimal fertilizer requirements. The development of a user-friendly web application further demonstrated the reliability of machine learning predictions, empowering farmers with tailored insights for enhanced productivity and sustainability in agriculture.

Deployment Link:http://16.170.164.183:5000/

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- **https://www.kaggle.com/code/niteshhalai/crop-price-dataset/**
- **https://www.kaggle.com/code/mahmoudmagdyelnahal/crop-yield-prediction-99/input**

- **https://www.kaggle.com/code/niteshhalai/crop-recommendation-dataset/**

- **https://www.kaggle.com/datasets/gdabhishek/fertilizer-prediction?resource=download**

ANY QUESTIONS?


Thank
you!