



edunet
foundation

Crop and Fertilizer Recommendation System using Machine Learning

Name: Dipanshu Dhage
Email Id: dipanshu9131@gmail.com

Learning Objectives

- Understand the challenges in modern agriculture related to crop and fertilizer selection.
- Learn how machine learning can solve real-world agricultural problems.
- Gain practical experience in:
 - Data preprocessing and analysis
 - Training and evaluating ML models
 - Building a user interface using Streamlit
 - Deploying a complete AI application
- Apply OCR techniques to extract data from documents.
- Learn how to manage projects using GitHub.



Tools And Technology Used

- **Python:** Main programming language for the project.
- **Streamlit:** Framework for building the interactive web interface.
- **pandas:** For data manipulation and analysis.
- **scikit-learn:** Used to train machine learning models (Random Forest).
- **pytesseract:** Extracts text from image-based soil reports (OCR).
- **PyMuPDF (fitz):** Extracts text from PDF soil reports.
- **GitHub:** For version control and project management.



Methodology

- **Data Collection:** Gather and preprocess datasets for crops and fertilizers.
- **Model Training:** Train Random Forest models to predict crops and fertilizers.
- **OCR Extraction:** Use pytesseract to extract soil data from uploaded images or PDFs.
- **Streamlit Integration:** Create an interactive app for users to upload reports and get recommendations.
- **Model Deployment:** Save models as .pkl files for real-time predictions.



Problem Statement:

- Farmers often face challenges in selecting the right crop and fertilizer due to varying soil conditions, climate, and other factors.
- Traditional methods of crop and fertilizer selection are time-consuming and lack accuracy.
- There is a need for a solution that:
 - Provides tailored crop and fertilizer recommendations based on real-time soil data.
 - Helps farmers optimize their agricultural practices, increasing crop yield and sustainability.



Solution:

- **AI-Powered Recommendation System:**

- Leverages machine learning to provide real-time crop and fertilizer recommendations.
- Uses soil test reports (extracted via OCR from images/PDFs) as input data.

- **Features:**

- Interactive web app built with **Streamlit** for ease of use.
- Machine learning models trained on crop and fertilizer datasets.
- Personalized suggestions based on soil nutrients (NPK), irrigation type, and crop preferences.

- **Impact:**

- Helps farmers make informed decisions for higher crop yields.
- Saves time and resources by suggesting optimal crop-fertilizer combinations.



Screenshot of Output:

Crop and Fertilizer Recommendation System

Enter your soil and weather conditions below to get AI-based crop and fertilizer suggestions.

Enter Soil and Weather Parameters

Nitrogen (N)	Potassium (K)	Temperature (°C)
90 - +	58 - +	27.00 - +
Phosphorous (P)	pH level	Humidity (%)
30 - +	7.00 - +	80.00 - +
	Rainfall (mm)	
	100.00 - +	

Get Recommendations

 Recommended Crop: **watermelon**

 Recommended Fertilizer: **Urea**

 Tip: Apply fertilizers in split doses and ensure proper irrigation for best yield.

Conclusion:

- The **AI-powered Smart Crop and Fertilizer Recommendation System** simplifies and optimizes agricultural decision-making for farmers.
- By integrating machine learning with real-time soil data, the system ensures accurate and personalized crop and fertilizer recommendations.
- This solution:
 - Enhances farm productivity.
 - Saves time and resources.
 - Contributes to sustainable agricultural practices.



Thank You!

Contact Information:

• **GitHub:** <https://github.com/dipanshudhage/Skill4Future>