Features:

1.For crop prediction model-

existing XGBoost model more accurate by feeding it better data and fine-tuning it.

Add Weather Data

Using the OpenWeatherMapAPI to get historical weather data (temperature,

Optimize the Model ⚙️

Using Scikit-learn's GridSearchCV to find the best possible settings for XGBoost model, maximizing its accuracy

Tech Stack:

* Model: XGBoost
* Libraries: Python, Pandas, Scikit-learn
* Data Source: OpenWeatherMap API

Future Scope:

even higher accuracy on time-series data, the next step would be to implement an LSTM (require more data and would take more time to train but is better so in future) using pytorch , tensorflow

2. Smart Crop Recommender

a. adding all the crops they have In storage It recommends the most **profitable crops** to plant based on the farmer's location and soil type. It uses price prediction model in the background to forecast which crops will have the highest market value

3. AI-Powered Pest & Disease Detection

A system where a farmer uploads a photo of a crop's leaf, and an AI model identifies if it has a disease or pest infestation

Tech stack – ai model – cnn for image classification , framework – tensorflow and pytorch

4. also converting into a full on local market like digital mandi

* A listing platform where registered farmers can post their available produce (e.g., "500kg of Wheat available in Pune"). Local buyers, retailers, or even consumers can then view these listings, see the farmer's asking price (which could be influenced by price prediction model), and connect directly.
* can add a feature for buyers to make negotiable offers

why usefull –

cuts out the middlemen, allowing farmers to get better prices and retain a higher percentage of their profit. It also creates a transparent and efficient local supply chain

tech stack -   
  
expanding flask to be able to handle new functionalities like creating, reading, updating, and deleting listings  
  
database – firebase or postgres or mongodb  
  
a dashboard. -   
  
A live dashboard showing the current wholesale prices for various crops at nearby official agricultural markets (mandis)  
  
using api like **Agmarknet** (data.gov.in) provide real-time data on mandi prices across India

why usefull ?

knowing the official, real-time market rates, farmers are better equipped to set their own prices and negotiate effectively. It brings transparency to a traditionally opaque system

5. AI-Powered Satellite Image Cleaning.

* A system that uses an AI model to intelligently remove clouds, cloud shadows, and atmospheric haze from satellite images of a farmer's field.

Why use full?

Raw satellite data is frequently unusable because of clouds. By cleaning these images, unlock the ability to perform consistent and accurate analyses over time, such as monitoring soil health, checking crop growth, or assessing water stress. This makes advanced remote sensing practical

So a personal farmer soil or area advisor

Tech stack –

 **I Model**: A **Generative Adversarial Network (GAN)**, specifically a **pix2pix** or **CycleGAN** architecture, is the best tool for this. These models are designed for image-to-image translation tasks, essentially learning how to "translate" a cloudy image into a clear one.

 **Framework**: **TensorFlow** or **PyTorch** for building and training the GAN.

 **Image Processing**: **OpenCV** and **Rasterio** (a library for geospatial raster data) to handle the satellite images.

 **Data Source**: For the hackathon, you can get free satellite imagery from sources like **Sentinel Hub** or the **USGS EarthExplorer**

**Refrences**

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