Sri Sivasubramaniya Nadar College of Engineering

Team Name: DevDuo

Project Name: SoilSenseAR

Team Members:
Neha L Senthil
Vidharshana Ravi

Problem Statement:

Inefficient and expensive traditional methods of monitoring soil moisture and crop health make it difficult for farmers to make informed decisions related to irrigation management, pest control, and crop growth, leading to decreased crop yields and financial losses.

Identification and Explanation of Problem Statement :

The agricultural industry is facing challenges related to irrigation management, pest control, crop growth, and soil health. The lack of real-time and accurate information on these parameters hinders effective agriculture management. Traditional methods for monitoring these parameters are often expensive, time-consuming, and limited in their scope. Therefore, there is a need for a solution that leverages technology to provide accurate, timely, and cost-effective information to farmers, agribusinesses, and other stakeholders.

Description of a creative solution to the issue identified.

The proposed solution is an AI-based mobile application that leverages machine learning algorithms, satellite image data, and augmented reality (AR) technology to provide farmers with real-time and accurate information on soil moisture, crop growth, environmental conditions, pest control, and irrigation management.

The application's unique selling point is

- its ability to leverage advanced machine learning algorithms to analyze satellite images and provide farmers with valuable insights on crop health, water requirements, and pest outbreaks and,
- its ability to display information and details using AR technology, making it easier for farmers to visualize the data and take informed decisions.

Concept behind proposed solution:

The solution aims to address the issues faced by farmers such as lack of timely and accurate information on crop health, soil moisture, environmental conditions, and irrigation needs, leading to reduced crop yields and financial losses. By using remote sensing and GIS technologies, the solution can collect and analyze satellite images and other geospatial data to monitor crop health, soil moisture, and environmental conditions.

Description of the techniques and technology used in creative solutions to reach a specific goal.

- Public datasets such as MODIS (Moderate Resolution Imaging Spectroradiometer), SMAP (Soil Moisture Active Passive), and CASM (Central Asia Soil Moisture) can be used for training machine learning algorithms to analyze satellite images and generate accurate predictions on soil moisture, crop health, pest outbreaks, and irrigation needs.
- Remote sensing and GIS (Geographic Information System) technologies: Remote sensing and GIS technologies will be used to collect and analyze satellite images and other geospatial data to monitor crop health, soil moisture, and environmental conditions. The data will be analyzed using machine learning algorithms to generate accurate predictions and insights.
- Machine learning algorithms: Advanced machine learning algorithms such as convolutional neural networks (CNNs), random forests, and support vector machines (SVMs) will be trained on public datasets to analyze the satellite images and generate accurate predictions on crop health, soil moisture, pest outbreaks, and irrigation needs.
- Augmented Reality (AR) technology: AR technology will be used to display the data collected by remote sensing and GIS technologies in a user-friendly and intuitive way. This will enable farmers to visualize the data and gain insights into their crops' health and growth patterns.
- Mobile application: The mobile application will be developed for iOS and Android devices and will be designed to be user-friendly and accessible to a wide range of users. The application will integrate remote sensing, GIS, machine learning, and AR technologies to provide farmers with real-time and accurate information on their crops.

Project's purpose and goals:

- Develop an app that uses machine learning algorithms to analyze satellite images and generate accurate predictions on soil moisture, crop health, pest outbreaks, and irrigation needs.
- Provide farmers with real-time and cost-effective monitoring of soil moisture and crop health to make informed decisions related to irrigation management, pest control, and crop growth.
- Increase crop yields and reduce financial losses for farmers by improving the accuracy and efficiency of crop management practices.

- Utilize publicly available datasets such as MODIS, SMAP, and CASM to reduce the cost and time required for data collection and analysis, making it more accessible to farmers in remote areas with limited resources.
- Incorporate augmented reality technology to display information and details in a user-friendly and interactive way.

Feasibility of Solution:

The proposed solution is feasible as it leverages widely available and accessible technologies such as remote sensing, GIS, machine learning, AR, mobile application development, and cloud computing. These technologies are scalable, cost-effective, and can be deployed in remote areas with limited infrastructure. The use of public datasets for training machine learning algorithms reduces the cost and time required for data collection.

Advantages:

- Does not require any complex inputs from users- uses gps to get coordinates, and pincode for area's data.
- Real-time and accurate information: The mobile application will provide farmers with real-time and accurate information on soil moisture, crop growth, environmental conditions, pest control, and irrigation management.
- Cost-effective: The application will be cost-effective compared to traditional methods of monitoring soil moisture, crop growth, environmental conditions, pest control, and irrigation management.
- AR technology for visualization: The use of AR technology will make it easier for farmers to visualize the data and take informed decisions.
- Easy to use: The mobile application will be easy to use and accessible to a wide range of users, including those in remote areas

Disadvantages:

- Depends on mobile phone technology- which might not be accessible in very remote areas
- Difficult to make this reach target users(hence we plan to integrate this with govt apps)
- Some features might require more bandwidth to run