AI ASSISTED PLANT DISEASE DETECTION, CROP AND FERTILIZER RECOMMENDATION SYSTEM

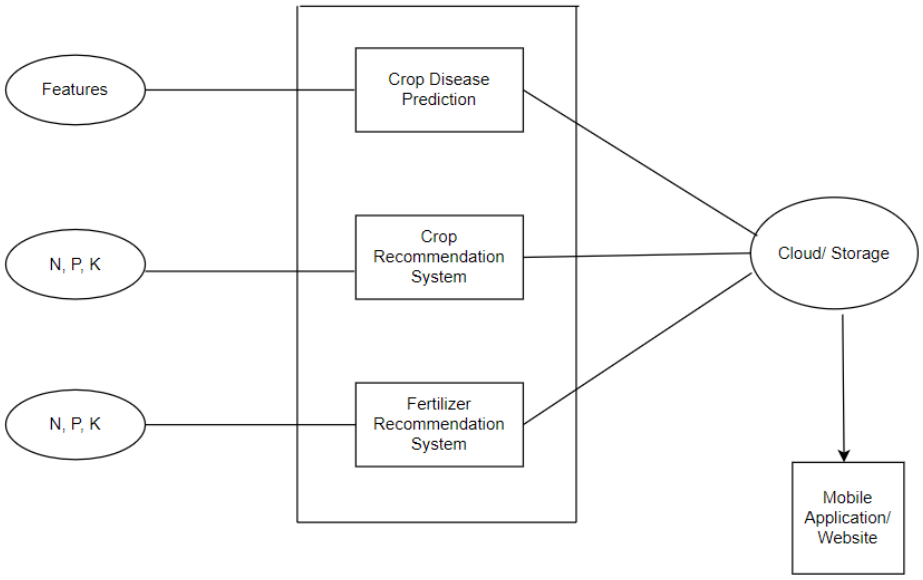
Field of Invention

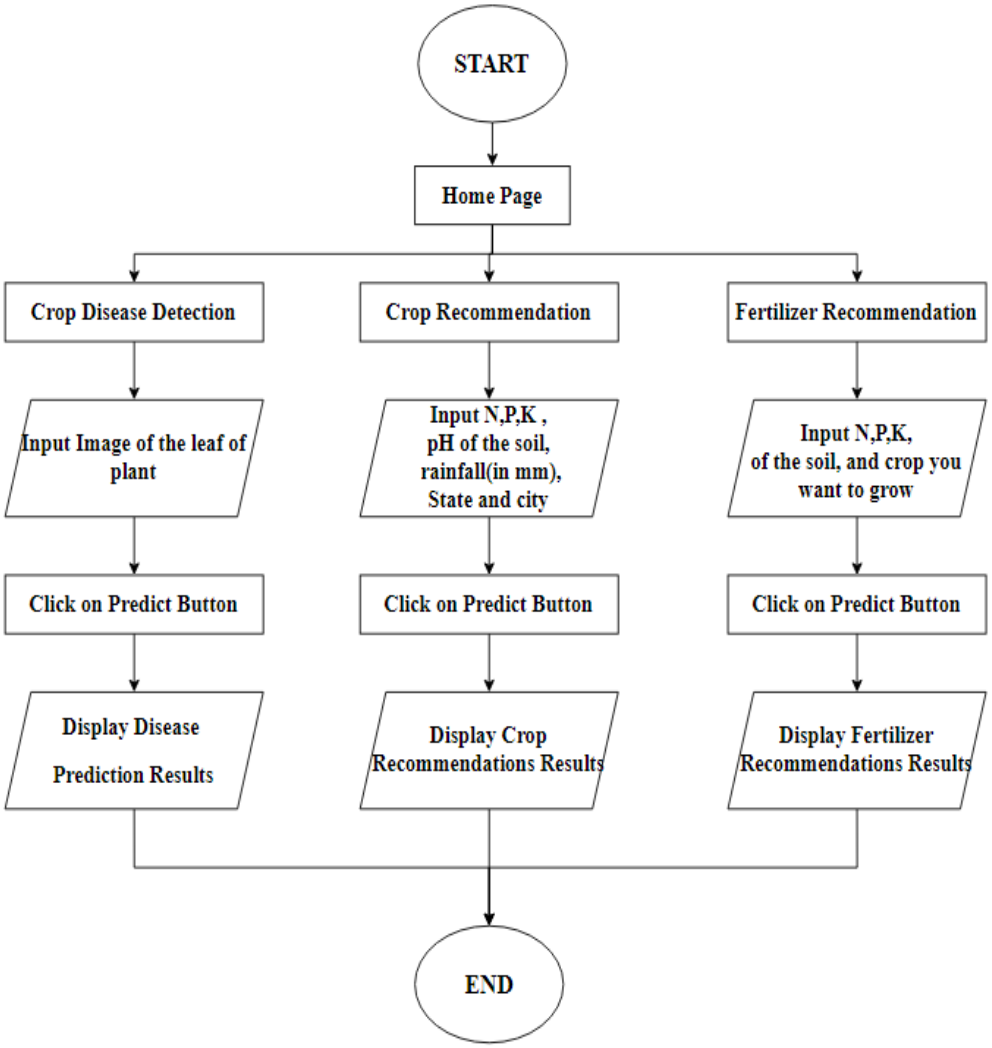
Agricultural Decision Support Systems are advanced technologies designed to improve agricultural practices by using data-driven insights and offering valuable assistance to farmers. The concept includes three important elements: predicting plant diseases, predicting fertiliser needs, and recommending crops. This model has the potential to improve crop health by detecting diseases early and optimising fertiliser selection, ultimately promoting environmental sustainability. The combination of plant disease prediction, fertiliser prediction, and crop recommendation systems is a game-changer for agriculture. It promotes sustainable practices, improves resource management, and boosts productivity for farmers all over the world.

Motivational Background

Crop recommendation, plant disease detection, and fertiliser recommendation technology have played a revolutionary role in transforming agriculture. Thanks to the combination of advanced AI and machine learning, farmers now have the ability to detect diseases early on. This technology allows for quick intervention, helping to minimise crop losses. AI-powered crop recommendations consider various regional factors to promote sustainable practices and optimise crop yield. When it comes to fertiliser recommendations, it's important to strike a balance between retaining soil nutrients and ensuring long-term fertility. The goal is to minimise waste and any negative impacts on the environment. By fostering a closer bond between farmers and nature, this digital change encourages ethical farming. These advancements allow farmers to play a crucial role in driving positive change, by promoting prosperity, sustainability, and ensuring food availability. Our vision is to create a future where agriculture flourishes, providing nourishment and optimism for all, through a harmonious blend of technology and respect for traditional practices.

Diagrams





Claim

A remarkable revolution in agriculture is on the horizon, thanks to the seamless integration of advanced technologies for plant disease detection, personalised crop recommendation, and sustainable fertiliser recommendation. By providing farmers with advanced AI-driven insights, this comprehensive approach enhances crop productivity, reduces losses, and promotes environmentally friendly practices. The combination of technology and traditional wisdom creates a balanced relationship with nature, which helps to ensure food security and promote economic prosperity. This significant change sets the stage for a better and more sustainable future. It guarantees that future generations will have an abundant harvest and emphasises the crucial role of agriculture in feeding the world.

Technology Used

- Pytorch
- Scikit-learn

- Keras
- Numpy
- Pandas
- Open-CV
- Flask
- Html,CSS,Javascript
- Google Dailogflow
- Google Translate API
- Open Weather API

Abstract

In this project, we aim to enhance agricultural practices by integrating cutting-edge technologies in plant disease detection, crop recommendation, and fertiliser recommendation. By utilising artificial intelligence, machine learning, and data-driven insights, this system empowers farmers to promptly and accurately detect plant diseases. This enables them to take proactive measures in a timely manner, effectively reducing crop losses. When it comes to crop recommendations, personalised advice takes into account factors such as the specific soil conditions in your area, the local climate, and the current market demands. The goal is to help you achieve the highest possible yield and profitability while also promoting sustainable farming practices. Using fertiliser in an optimised manner not only helps manage nutrients efficiently but also minimises the impact on the environment. Additionally, the project includes a chatbot that is designed to be user-friendly. This chatbot is powered by Google Dialogflow, which enables it to provide farmers with immediate guidance and support. The Google Translate API is a valuable tool that helps people communicate in multiple languages, which is especially beneficial for farming communities. It promotes the sharing of knowledge and ideas among diverse groups of farmers. We have a vision of a future where farmers are equipped with advanced tools that empower them in agriculture. With these tools, they can make well-informed decisions, enhance productivity, and play a crucial role in ensuring global food security while being environmentally conscious. The goal of this transformative approach is to completely change traditional farming methods and create a more prosperous and sustainable agricultural landscape.

End users

1. Farmers: Farmers are the main users of the system, as they are the ones who directly utilise the technologies in their daily farming activities. With plant disease detection, farmers can identify and treat diseases promptly, minimizing crop losses and preserving yields. Providing crop recommendations that are customised to suit the specific conditions of a particular area is extremely valuable for farmers. This enables them to make well-informed decisions, select the most suitable crops for planting, and ultimately, maximise their profits. Fertiliser recommendations are beneficial for farmers as they assist in optimising resource usage, resulting in cost savings and a reduced environmental footprint.

2. Agricultural Professionals: The system's capabilities are also beneficial for agricultural consultants, agronomists, and extension officers. The technology can be utilised to offer expert advice to farmers, helping them with disease diagnosis, providing customised crop plans, and guiding them in optimising fertiliser usage. The system serves as a valuable tool that helps

enhance their services and supports farmers in their efforts to achieve sustainable and profitable farming practices.

3. Agricultural Researchers: The data collected by the system can be used by researchers in the agricultural field for analysis and further studies. Aggregated data on plant diseases, crop performance, and fertiliser effectiveness can play a significant role in scientific research and provide valuable insights for the development of new agricultural innovations.

4. Agricultural Companies: Companies in the agricultural sector have the opportunity to utilise the system to provide farmers with specialised services. These services can include disease detection and crop management solutions. This fosters collaborations and creates business opportunities in the market for agriculture technology.

5. Policy Makers and Government Authorities: Government officials and policymakers have the opportunity to use the data generated by the system to better understand regional agriculture trends. This information can help them identify areas that need support and improvement. By implementing targeted agricultural policies, they can encourage sustainable farming practices and ensure food security.

Advantage

1. Early Disease Detection: Thanks to technology, plant diseases can now be detected early on. This is great news for farmers as it allows them to take prompt action and prevent the spread of infections, ultimately minimising crop losses. By adopting this proactive approach, farmers can effectively safeguard their crop yields and ensure the overall health of their plants.

2. Precision Crop Recommendations: When providing crop recommendations, we consider factors such as the specific soil characteristics in the area, the local climate conditions, and the demands of the market. Farmers are provided with personalised guidance on the most suitable crops to cultivate, the optimal timing for planting, and effective land cultivation techniques. As a result, it leads to increased yields and greater profitability.

3. Effective Fertilizer Management: The fertiliser advice feature uses soil test findings and crop requirements to provide precise and effective recommendations for nutrient application. By decreasing the usage of fertilisers, not only is the environmental impact reduced, but farmers also save money.

4. Sustainable Farming Methods: The system promotes responsible resource utilisation, reduces the need for excessive chemical inputs, and encourages environmentally friendly farming practices through the use of data-driven decision-making and sustainable agricultural methods. This practice helps maintain the sustainability of ecosystems and promotes the long-term health of the soil.

5. Greater Productivity: Cutting-edge technologies are being applied to streamline agricultural operations, which ultimately saves farmers a significant amount of time and reduces the need for manual labour. Technology plays a crucial role in supporting and providing valuable insights to farmers by harnessing the power of AI and machine learning. This ultimately leads to a significant increase in farm output.

6. Accessible Knowledge Sharing: The chatbot facility powered by Google Dialogflow makes it easy for farmers to communicate. They can request assistance, ask questions, and get important information in their own language. This fosters the exchange of information among different farming communities.

7. Increased Food Security: The system plays a crucial role in enhancing crop yields and ensuring a consistent food supply by offering better disease diagnosis, efficient crop planning, and optimal fertiliser utilisation. During challenging times, ensuring food security for communities and regions becomes especially crucial.

Conclusion

Agriculture has advanced dramatically with the integration of crop recommendation, plant disease detection, and fertilizer recommendation technology. The research aims to help farmers make better decisions by using artificial intelligence and machine learning. It provides them with important insights that are crucial for their decision-making process. Identifying diseases in crops at an early stage is crucial for promoting healthier yields and minimising crop losses. By providing personalised recommendations for crops and fertilisers, farmers are able to optimise their resource usage without compromising on the quality and quantity of their output. To facilitate the exchange of knowledge among different farming communities, a user-friendly chatbot and language translation feature have been implemented. This allows for seamless communication and interaction. The main goal of this strategy is to support a flourishing and environmentally friendly agricultural industry. It achieves this by seamlessly combining technology with traditional farming methods. The main objective of this system is to encourage global initiatives in sustainable food production and enhance food security by equipping farmers with state-of-the-art equipment. The innovative approach offers a glimmer of hope for agriculture as it faces new challenges by enhancing the future of farming communities and providing ethical agricultural methods to feed the world.

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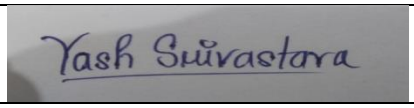
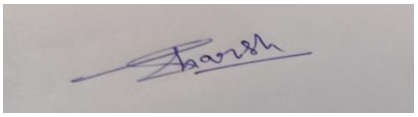
Yash Srivastava	yash.2024cs1099@kiet.edu	
Harsh Srivastava	harsh.2024it1079@kiet.edu	
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