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Crop Sphere AI

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Abstract: The Crop Sphere AI is an online platform built to help farmers detect plant diseases and obtain farm advice using an intelligent, interactive interface. Developed with Python, Django, HTML, CSS, JavaScript, and PostgreSQL, it has a crop disease detection mechanism based on deep learning using a Convolutional Neural Network (CNN) for image processing and an Artificial Neural Network (ANN) for precise prediction. The platform features a multilingual AI chatbot known as Crop Bot, which, through GROQ's Llama 3 API, gives responses in Malayalam, Tamil, Hindi, and English. It offers advice on how to take care of your crops based on their needs and helps fix problems caused by diseases. Users also get recommendations on treatment and are able to access Government Schemes from the Ministry of Agriculture. With secure authentication and an intuitive interface, Crop Sphere AI equips rural farmers with increased adaptability by improving disease diagnosis, crop care, and evidence-based agricultural decision-making to enhance productivity.

Keywords: *Crop Disease Detection, Deep Learning, Convolutional Neural Networks, Artificial Neural Network, AI-Powered Chatbot, Multilingual Support, Treatment Recommendation, Smart Agriculture.*

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I. INTRODUCTION

Agriculture is the backbone of India's economy, and most of the population relies on it for livelihood. While technology has advanced quickly in many fields, farming methods in rural India mostly still stick to traditional ways. One of the age-old issues of farmers is the timely and accurate diagnosis of crop disease. Lack of instant access to agricultural scientists and disease information results in crop loss, financial loss, and food insecurity. Using new tech like AI and Deep Learning can really boost farming success and help it stay sustainable. For this requirement, CROP SPHERE AI has been designed as a smart web-based platform intended to help farmers diagnose crop disease, prescribe treatment, and offer multilingual assistance through an AI-powered chatbot. The intention is to offer actionable information to farmers and minimize reliance on physical consultation, saving time and enhancing efficiency. CROP SPHERE AI is an AI-powered web application that seeks to introduce modern, accessible, and user-friendly technology to the agriculture sector. Implemented using Python and Django in the backend, the platform offers a secure, scalable, and manageable server-side platform. The frontend uses HTML, CSS, and JavaScript to create a smooth and easy-to-use experience for the user. The main thing about the platform is its ability to identify crop diseases just by looking at images. Farmers can upload images of crop disease, which are processed using a Deep Learning model consisting of a Convolutional Neural Network (CNN) and an Artificial Neural Network (ANN). The CNN picks out visual details like the texture of leaves, changes in color, and patterns of any spots or damage. These extracted features are then input into the ANN, which uses the learned patterns to classify the disease. CROP SPHERE AI stands out because it doesn’t depend on pre-trained models like most other platforms do. Instead, it builds its own models from the ground up, personalized specifically to local farms and the data available in the area. This provides more customization, flexibility, and control over training, making it more context-sensitive to specific crops and diseases. The platform also has something called the Crop Bot, which is an AI-powered chat tool that speaks multiple languages and gives farmers help instantly

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whenever they need it. This chatbot is driven by the Llama 3 API through GROQ, making it able to recognize and respond to user queries in English, Malayalam, Tamil, and Hindi. Users can switch between languages through a simple interface, making it possible for them to converse in the language they are most comfortable with. The chatbot answers questions pertaining to crop diseases, care practices, and general agricultural guidance, available 24/7 through the web interface. The platform also includes a Treatment Recommendation system offering farmers best practices and cures based on the identified disease. CROP SPHERE AI also includes a Government Schemes section showing information about agriculture schemes by the Ministry of Agriculture, making it possible for users to remain updated with current schemes, though applications for these schemes are not supported within the platform. For security and privacy reasons, the application includes a user authentication system with Sign Up and Sign In features. This makes sure each user's info is customized for them and kept safe. CROP SPHERE AI uses deep learning and natural language processing to build a smart, location-aware tool that farmers can easily access, especially in areas where digital resources are limited. This marks a major move forward in bringing digital advancements to agriculture through the integration of AI technology.

II. LITERATURE SURVEY

Using AI in farming has come a long way recently, especially when it comes to spotting plant diseases. Historically, farmers used expert judgment and manual inspection to diagnose diseases, which is typically time-consuming, subjective, and unavailable to the masses in rural areas. This gave rise to AI-based systems as efficient, scalable, and capable of improving the accuracy of disease detection. Convolutional Neural Networks, or CNNs, are widely used in deep learning for analyzing and interpreting image data. CNNs are best suited for pattern identification in crop images, i.e., texture, color gradients, and distortions due to plant diseases. The application of CNNs has been shown through various studies to be successful in disease classification from leaf images. Most of the current systems use pre-trained models, which would not generalize as well with region-specific diseases. Crop Sphere AI sets itself apart by building its CNN model from the ground up, training it on datasets that are specifically focused on Indian crops and how diseases show up locally. This helps the system get better at understanding and recognizing the visual signs of different diseases more accurately. After pulling out the important features, we use Artificial Neural Networks (ANNs) to figure out what disease is causing the issue. Artificial neural networks are capable of capturing complex, non-linear patterns in data, making them well-suited for identifying detailed features of diseases. The combination of CNNs for feature extraction and ANNs for classification gives rise to an effective architecture for accurate plant disease detection. The layered architecture allows Crop Sphere AI to be able to have high precision in disease prediction of crops using image inputs. AI isn't just used for detection; it's also making a big difference in how we communicate and provide support, thanks to the development of smart chatbots. Earlier systems mostly used simple, rule-based chatbots that provided only limited interactions. In contrast, Crop Sphere AI uses a more advanced chatbot powered by the Llama 3 API, enabled through GROQ support, providing a notably richer and more flexible user experience. This enables the chatbot to process natural language questions, provide real-time support, and provide multilingual support for English, Malayalam, Tamil, and Hindi interactions. Crop Sphere AI differs from other platforms in integrating disease prediction, treatment suggestions, and multilingual AI interaction in one web-based platform. Its custom-built deep learning model, combined with an advanced chatbot interface, offers a more comprehensive and user-focused experience. The system is thoughtfully designed to address the specific needs of local agriculture, aiming to equip Indian farmers with smart tools that enhance crop management. Its focus is on promoting sustainable farming through affordable, AI-driven solutions that support both productivity and environmental responsibility.

III. EXISTING SYSTEM

The current systems in agriculture for crop disease detection are mostly based on conventional approaches or partial automation. The agricultural industry has witnessed incremental uptake of AI in recent years, yet most systems are still siloed, providing stand-alone solutions to farmers. These platforms usually specialize in either disease detection or disease management, but rarely both together in a single, integrated solution. They tend to lack a comprehensive approach that brings all the necessary tools into one unified platform. These systems often face challenges when it comes to supporting multiple languages, ensuring accessibility for all users, and accurately recognizing diseases that are unique to particular regions. The systems currently in use also lack adequate real-time guidance and personalized dialogue for farmers. Prior to the introduction of AI, crop disease identification relied predominantly on visual scanning by farmers and agricultural specialists. These traditional practices are time-consuming, unreliable, and tend to be subject to human error. Farmers usually depend on their own knowledge or local extension services in agriculture to determine disease symptoms, but these may not always be accessible, particularly in rural communities. In addition, diseases can quickly move and spread, so detecting them early is important. The delays in diagnosis result in extensive crop damage, impacting both farmers' lives and the agricultural economy. Mobile apps for disease identification have only gained popularity recently, serving as a quick and accessible way to bridge the gap between experts and rural farmers. Platforms such as Plantix and AgroBase are able to accommodate images of crops sent by their users for their identification. Most of these apps use pre-trained models or simple image analysis techniques to identify diseases in crops. Though these apps respond promptly, they lack accuracy and specificity. Pre-trained models also tend to overlook local crop variations in regions and may not be updated with diseases common in some areas. Sometimes, the apps provide generic advice that doesn't quite fit the specific conditions of local farms. There have been some AI-based systems designed to automate crop disease detection using deep learning methods. These platforms tend to use Convolutional Neural Networks (CNNs) or other image

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classification models to scan images of crops and identify diseases. Such systems include the Deep Plant Pathology and Plant Disease Detection System projects, which employ CNNs to classify diseases from leaf images. These systems typically rely on pre-trained models and local datasets that aren't specifically adapted to regional farming conditions, which often leads to less effective performance in certain areas. The necessity for a specialized model for particular crops and diseases is often neglected, which then leads to incorrect predictions. Current systems really fall short when it comes to supporting multiple languages. Most apps, ranging from disease detection apps to systems based on artificial intelligence, are only in the English language or a few global languages. This becomes a constraint for their accessibility by farmers who don't share these languages. In India, agriculture is a major occupation, and farmers communicate using regional languages like Malayalam, Tamil, and Hindi. The current systems don't really cater to the fact that many farmers speak different languages. This makes it hard for a lot of people who aren't comfortable using interfaces that are only in English. Language support is an essential component in promoting communication, and without it, these systems suffer from the effectiveness in achieving their maximum potential. Chatbots are now a core component of contemporary AI systems, providing interactive interfaces for users. Nevertheless, current chatbots in agriculture are generally limited in scope. Most chatbots in agriculture are rule-based, offering fixed responses to pre-defined questions. Although they can respond to simple questions, they cannot comprehend context, adjust to user requirements, or offer real-time support for complicated problems. In addition, most current chatbots are not capable of processing multilingual queries or regional differences in agricultural practices, so they are less effective for a multicultural farming community. Current agricultural systems tend to be non-integrated, providing isolated solutions for disease identification, treatment advice, or agricultural guidance. These systems do not offer a single platform where farmers can have access to all the tools, they need in one location. For instance, a disease diagnostic app can diagnose the disease of the plant but cannot provide a prescription for treatment or farming advice. Likewise, chatbots can give farming advice but cannot diagnose diseases or provide personalized advice for treatment. This fragmentation often leaves farmers feeling overwhelmed, making it difficult for them to find a comprehensive solution that addresses all their multiple concerns in one place.

IV. PROPOSED SYSTEM

CROP SPHERE AI is set to revolutionize how we handle crop disease management, offering a comprehensive, AI-driven web platform that optimizes and improves the entire process. It integrates advanced machine learning techniques, deep learning algorithms, and sophisticated chatbot capabilities to offer a comprehensive solution for identifying, managing, and providing guidance on crop diseases. The system is aimed at assisting farmers, especially rural farmers, to have simple access to tools that will aid them in early identification of crop diseases and get suitable treatment advice. At the center of CROP SPHERE AI is a disease detection system powered by deep learning. The system employs Convolutional Neural Networks (CNNs) to analyze and process images of infected crops. The CNN model is then trained on a diverse dataset to identify a range of plant diseases from visual features, thus making the identification process efficient and accurate. Unlike traditional systems that depend on pre-trained models, this approach is specifically designed to respond to the particular requirements of the local crops and the diseases common to the area. The system also employs Artificial Neural Networks (ANNs) for disease prediction and classification using features obtained through CNNs, which makes the whole process very dependable. Another unique feature of CROP SPHERE AI is its in-built multilingual chatbot Crop Bot. Using the Llama 3 API through GROQ, Crop Bot offers smart, multilingual support in English, Malayalam, Tamil, and Hindi. This provides access to a wider range of farmers irrespective of language choice. The chatbot helps farmers by responding to their questions, making disease diagnoses, recommending treatment options, and providing overall crop care guidance. The platform's multilingual capabilities remove language barriers, enabling farmers from diverse linguistic backgrounds to use it effectively and with confidence. The CROP SPHERE AI platform also features a treatment recommendation system that provides customized advice based on the results of disease prediction. Once a crop disease is diagnosed, the system presents a list of treatment recommendations, preventive tips, and best practices that can be adopted by farmers to control the disease. Following these steps, not only do farmers get help in controlling the disease but also enhance overall crop productivity and well-being. CROP SPHERE AI also provides detailed information about various government programs and initiatives designed to support farmers across India. While the platform itself does not manage application submissions, it shows important details regarding agricultural schemes so that farmers remain updated about the support that they can receive. This makes the platform more useful by giving extra information that adds to the knowledge of the farmer. Through 24/7 availability, customized disease management services, and multilingual support, the system proposed here is ready to bridge the gaps left by current systems and provide an effective solution for Indian farmers. Combining AI and deep learning with real-time support through Crop Bot enables farmers to make smarter decisions. This approach helps reduce crop losses and boosts overall productivity, leading to more efficient and successful farming practices.

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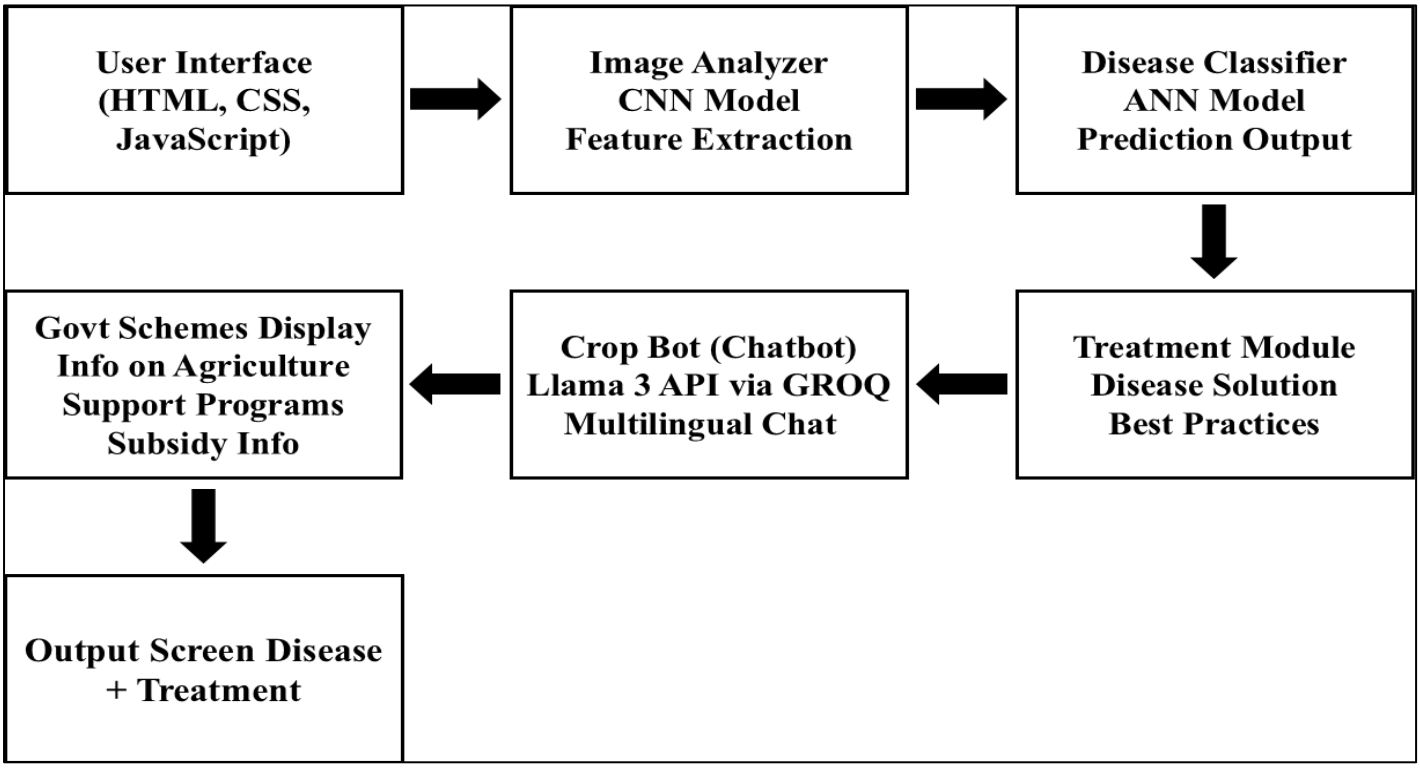

Fig 1 Block Diagram

V. SYSTEM REQUIREMENTS

Crop Sphere AI is a software-driven platform designed to support farmers by using artificial intelligence and deep learning. It helps in identifying crop diseases early and provides clear, actionable recommendations for treatment. Central to the system is a Python-based back-end created using the Django framework, providing a solid platform on which to develop highly scalable, secure, and modular applications. The system combines TensorFlow and Keras to execute self-designed Convolutional Neural Networks (CNN) and Artificial Neural Networks (ANN), designed especially for image processing of crops and disease classification using patterns learned. The frontend is built with HTML, CSS, and JavaScript to provide a responsive and user-friendly interface that can be accessed on smartphones, tablets, or desktops. Simplified in design, the interface is easy to use by farmers with different degrees of digital literacy, enabling them to upload images, engage with the chatbot, and receive results without needing sophisticated technical knowledge. The system operates completely online, without requiring any external hardware or sophisticated computing equipment only a smartphone or internet-connected device with the capability to capture images and browse is required. The main feature of the system is the integrated AI chatbot, Crop Bot, which uses the Llama 3 API via GROQ to effectively understand and handle natural language questions. This obviates the requirement of conventional NLP modules, as the Llama 3 API performs multilingual understanding and response generation natively. The chatbot is multilingual, supporting four languages, namely English, Malayalam, Tamil, and Hindi, rendering the platform regionally accommodating. A language switch button is built into the interface, allowing users to easily switch to their preferred language for a smooth, native-like experience. The system runs light and is designed to run fluently even on resource-constrained devices. The image uploads and predictions are done on the server, where the prediction and feature extraction are done by the deep learning models so that the processing does not rely on the internal capabilities of the device. The site is not based on real-time sensors or separate diagnostic equipment but on static image uploads for speedy and precise analysis. Security and privacy are enforced through Django's own authentication and session control systems, protecting farmer information and application integrity. The application's modular design makes scaling simple, and future additions such as support for additional crop varieties, regional extensions, or linkage with agricultural advisory services are made easy. Crop Sphere AI is an intelligent, accessible, and multilingual farm companion for farmers, offering timely insights and support through a device they already have bringing actual impact without the weight of complicated infrastructure.

VI. ALGORITHM

The Crop Sphere AI system combines advanced deep learning algorithms to provide farmers with a reliable tool for identifying crop diseases, suggesting suitable treatments, and communicating smoothly in multiple languages through its chatbot. The first main algorithm is the Convolutional Neural Network (CNN), which plays a central role in image processing and analyzing crops uploaded by farmers. CNNs are designed with the express purpose of automatically recognizing features in pictures, like spots, discolorations, or lesions that might be indicative of disease. What makes CNNs so strong is that they learn features directly from raw data and are thus exceptional at recognizing subtle patterns in images of crops. The algorithm processes visual information through several layers that include convolution, pooling, and

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activation functions. This approach allows it to identify features at different levels of complexity, enabling the CNN to detect diseases more accurately and reliably. After the images are processed by the CNN, the second very important component is the Artificial Neural Network (ANN), which processes the extracted features and classifies them into precise disease categories. The ANN learns to process the data using several layers of neurons, learning complex relations between the diseases and the features of the image. The ANN is trained with a large number of crop diseases, allowing it to classify most diseases accurately. It makes sure that the system gives accurate disease predictions and suitable treatment recommendations to the farmers. The third key component is the Llama 3 API integrated with GROQ, powering the multilingual Crop Bot to support smooth and interactive communication with farmers. The Llama 3 API enables the chatbot to manage natural language tasks directly, without requiring a distinct NLP module. The chatbot responds to farmers' queries in multiple languages including English, Malayalam, Tamil, and Hindi to better serve users from different backgrounds. Its replies are customized to be relevant and understandable in each language, ensuring a more comprehensive experience. Through the integration, the system is made simple, enhancing efficiency while enabling smooth interaction with users of various linguistic backgrounds. With the utilization of the Llama API, the chatbot can interpret and produce responses that address the needs of the farmers in real-time. All these algorithms CNN, ANN, and Llama 3 API operate in tandem to provide an integrated, easy-to-use platform that effectively identifies crop diseases, provides treatment suggestions, and has a multilingual interface. The system's deep learning features enable it to identify complex disease patterns, while its natural language processing makes it easy for a wide range of users to interact with smoothly. Through these coupled technologies, Crop Sphere AI becomes an end-to-end solution for crop health management, enabling farmers to maximize productivity and make evidence-based decisions.

VII. RESULTS

- *Accurate Crop Disease Detection*
- *Instant Multilingual Chatbot Support*
- *Reliable treatment recommendations*
- *Government Scheme Detail*

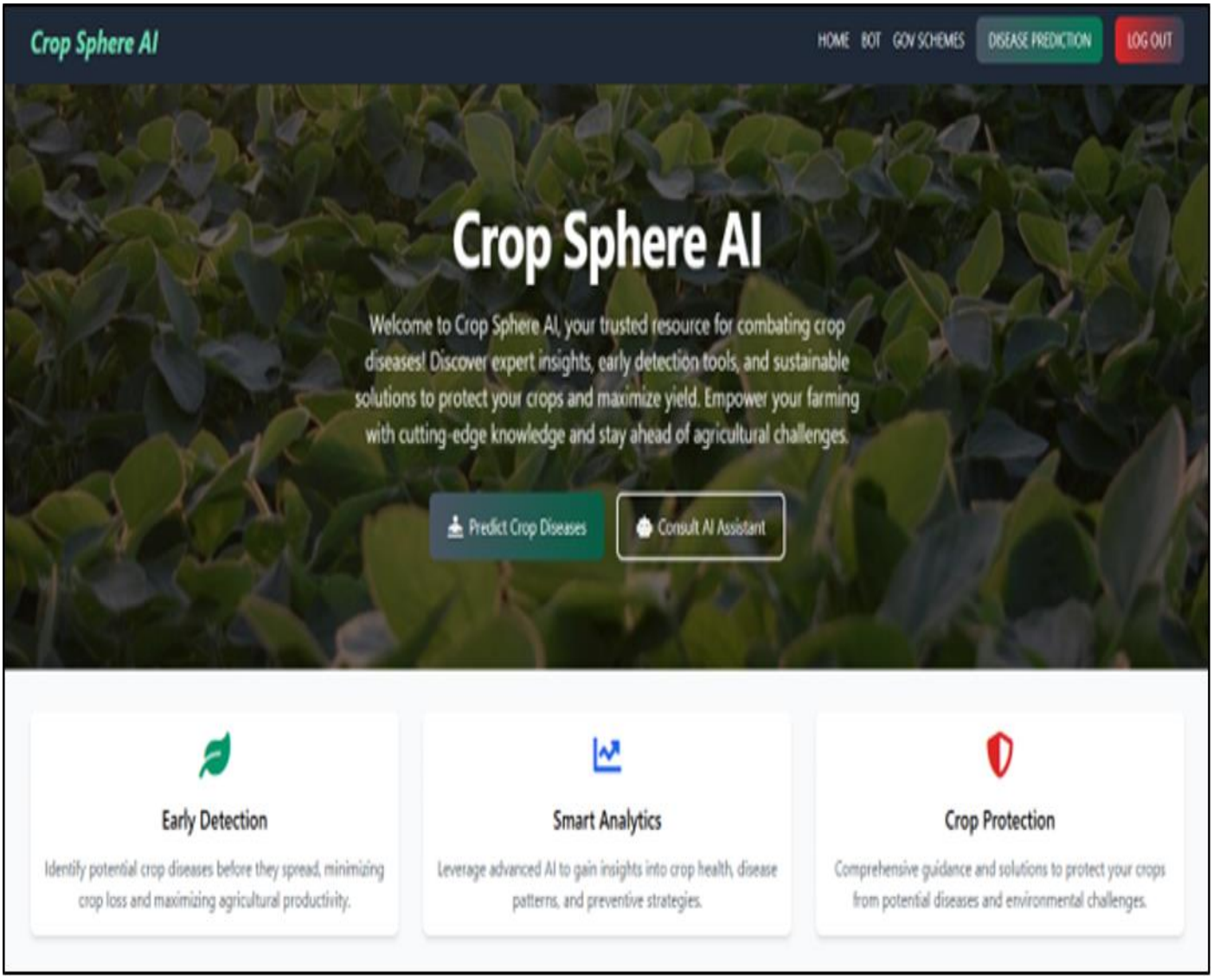

Fig 2 Home Page of Crop Sphere AI

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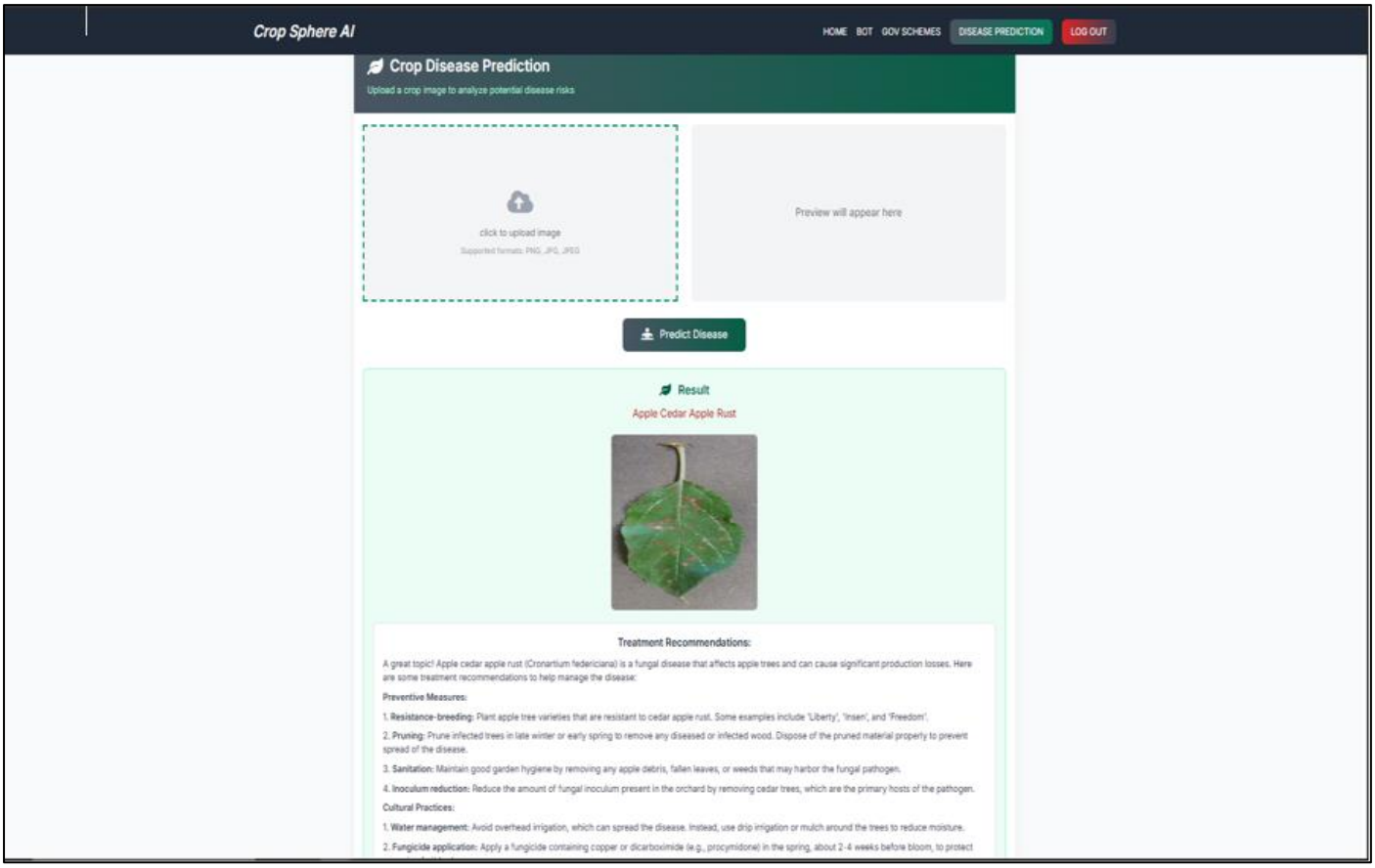

Fig 3 Disease Prediction

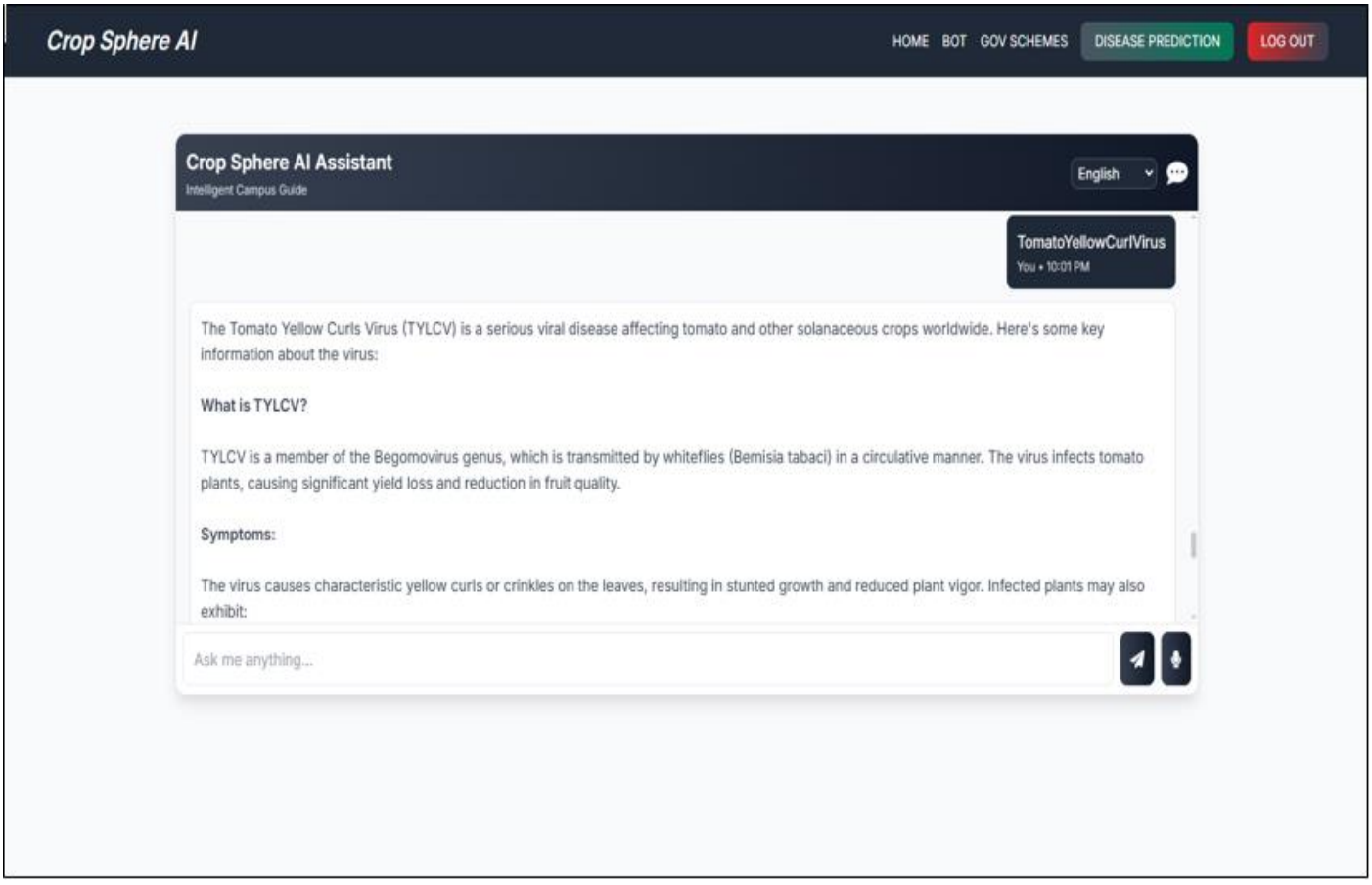

Fig 4 Crop Bot (Chatbot)

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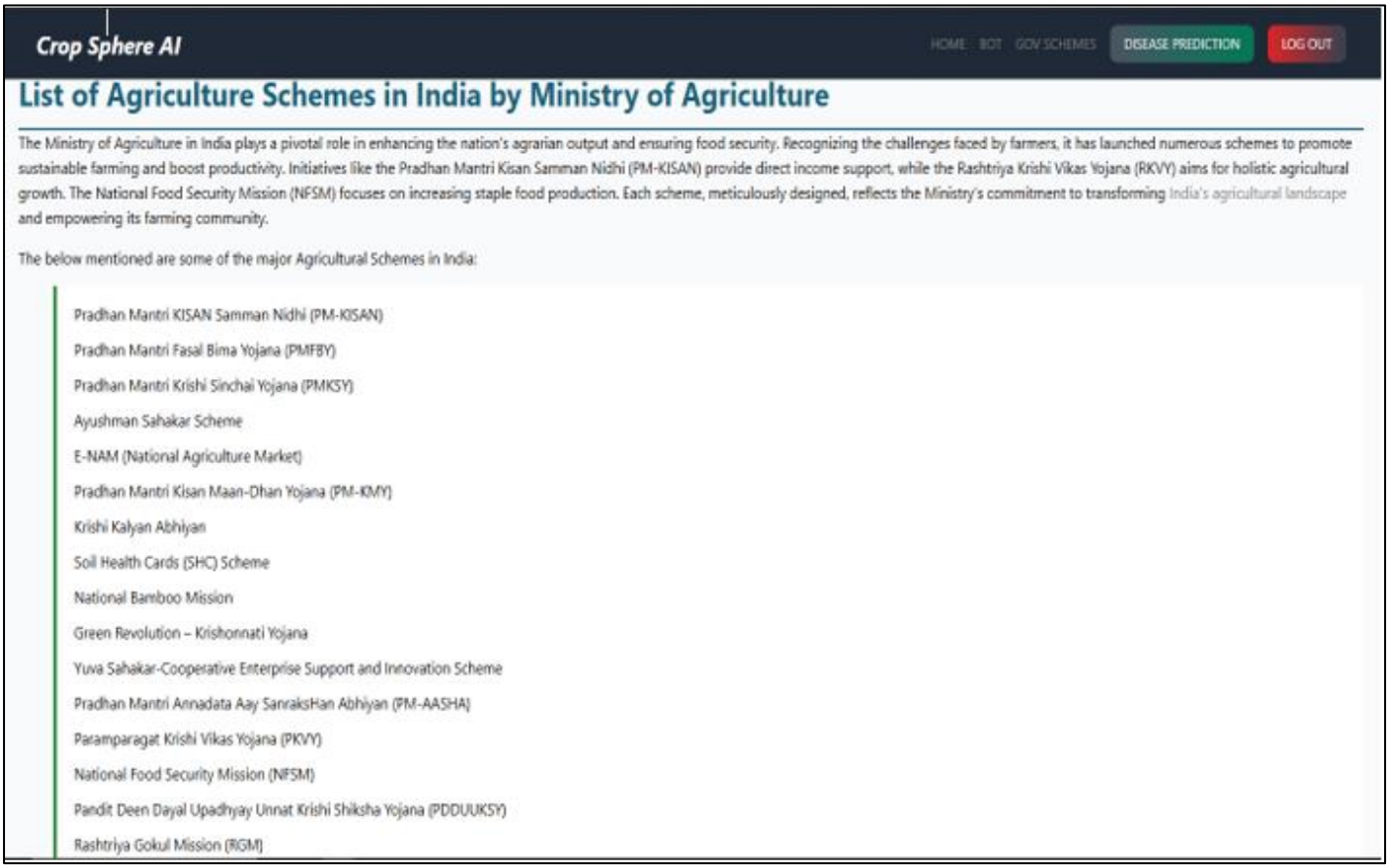

Fig 5 Government Schemes Details

VIII. CONCLUSION

Crop Sphere AI is a user-friendly, web-based platform designed to optimize farm management. It helps farmers detect, monitor, and respond quickly to crop diseases, making the entire process more efficient and fair. Through the implementation of custom-built CNN and ANN models for disease classification and integration of the Llama 3 API through GROQ to provide multilingual chatbot assistance, the application provides precise real-time interaction personalized to meet diverse user requirements. Farmers can simply upload images of crops, obtain treatment advice, and get important information about government agriculture schemes using a simple-to-use interface that is multi-lingual in Indian languages. Designed with accessibility and versatility in mind, Crop Sphere AI operates smoothly across common devices, no need for specialized equipment or technical know-how. This ensures farmers can easily use it whenever it fits their schedule. Its modular and scalable design ensures that future additions, including increased crop databases and more language support, are possible, rendering it a forward-looking and sustainable solution for the reshaping of modern agriculture.

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REFERENCES

[1]. Lee, J., & Kim, H. (2023). Construction of deep learning-based disease detection model in agriculture. Scientific Reports, 13(1), 34549. https://doi.org/10.1038/s41598-023-34549-2
[2]. Smith, A., & Johnson, L. (2024). Revolutionizing agriculture with artificial intelligence: Plant disease detection and prediction. https://doi.org/10.3389/fpls.2024.1356260
[3]. Chen, Y., & Wang, X. (2024). Leaf-based plant disease detection and explainable AI. arXiv preprint. https://arxiv.org/abs/2404.16833
[4]. Ferentinos, K. P. (2018). Deep learning models for plant disease detection and diagnosis. Computers and Electronics in Agriculture. https://doi.org/10.1016/j.compag.2018.01.009
[5]. Gupta, A., & Verma, S. (2025). Real-time multilingual farming assistance using NLP integrated web API. ResearchGate. https://www.researchgate.net/publication/3881
[6]. Brown, T., & Davis, K. (2024). AI chatbot delivers multilingual support to African farmers. NVIDIA Developer Blog. https://developer.nvidia.com/blog/ai-chatbot

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25apr1549

[7]. Mohanty, S. P., Hughes, D. P., & Salathé, M. (2016). Using deep learning for image-based plant disease detection. Frontiers in Plant Science,7,1419. https://doi.org/10.3389/fpls.2016.01419
[8]. Kumar, S., & Desai, V. (2023). Leveraging machine learning for intelligent agriculture. ResearchGate. https://www.researchgate.net/publication/3902
[9]. Fernandez, A. (2024, January 22). How AI and deep learning are transforming rural farming in India. https://www.cropsphereaiupdates.in
[10]. Too, E. C., Yujian, L., Njuki, S., & Yingchun, L. (2019). A comparative study of fine-tuning deep learning models for plant disease identification. Computers and Electronics in Agriculture,161,272–279. https://doi.org/10.1016 /j.compag.2018.03.032