AgroSense AI with News Aggregator

Ganeshram V,IV year CSE, SNS College of Engineering, Coimbatore. Email : miniram2705@gmail.com
Kaviyarasi R, IV year CSE, SNS College of Engineering, Coimbatore. Email : kaviyadharanya2705@gmail.com
Rakshita R, IV year CSE, SNS College of Engineering, Coimbatore. Email : rrakshita40@gmail.com
Semmozhi Jayam G, IV year CSE, SNS College of Engineering, Coimbatore. Email semmo1207@gmail.com

Abstract
Small-scale farmers face challenges such as plant diseases, pest infestations, soil fertility issues, water mismanagement, and unpredictable weather, which reduce crop yields and profitability, especially in remote areas with limited access to expertise. To address this, we propose an online platform connecting farmers with agricultural experts like agronomists and entomologists, fostering knowledge exchange to tackle these issues and promote sustainable farming. Leveraging deep learning, our study classifies soil textures using Convolutional Neural Networks (CNNs) to analyze soil images, employing techniques like image augmentation to improve datasets and exploring models such as Baseline, Augment, Dropout, and Padding. This AI-powered approach, integrated into our platform alongside a farmer discussion forum, empowers farmers with actionable insights, enhancing crop yields, conserving resources, and advancing food security and economic growth. AgroSense AI merges traditional agricultural wisdom with cutting-edge technology, offering tools and a collaborative community to drive a sustainable future in farming.

Keywords : AI powered , Convolutional Neural Networks, Deep Learning , Padding, Plant disease prediction, Soil texture classification

Introduction :

Farming is essential for human survival, providing food and other commodities, but farmers face numerous challenges such as pests, diseases, soil degradation, and unpredictable weather, which impact crop yield and quality. Access to expert advice is often limited, especially in remote areas, making it difficult for farmers to make informed decisions. Recent efforts have used technology, such as web-based platforms, to bridge this gap by connecting farmers with experts for advice on crop management.

This project aims to develop a user-friendly web application that allows farmers to post questions related to their crops, while registered experts can respond with guidance. A key feature is an AI-driven tool for soil texture classification, using deep learning to analyze soil samples. Accurate soil information helps farmers make better decisions about crop selection, irrigation, and fertilization.

The platform will provide real-time expert advice, AI-powered soil analysis, and agricultural updates. The interface will be simple and intuitive, with features like voice-to-text for accessibility. By combining expert knowledge with AI technology, this web application will help farmers improve productivity, reduce losses, and adopt sustainable practices, ultimately contributing to a more resilient agricultural sector.

Literature Review

1. Deep Learning in Soil Classification Using Convolutional Neural Networks (CNNs):

Lanjewar and Gurav (2022) demonstrate the use of Convolutional Neural Networks (CNNs) for classifying soil images, providing valuable methodologies for improving soil texture analysis through deep learning techniques. Their work contributes to our project by enhancing our ability to accurately classify various soil types from images, using advanced AI methods to offer precise, real-time soil assessments for farmers. This technique will be pivotal

in automating soil analysis and supporting informed decision-making in agriculture [1].

2. ICT for Agricultural Extension in Developing Countries:

Aker (2011) reviews the role of information and communication technologies (ICT) in agricultural extension, particularly in developing countries. Her research highlights the potential of ICT tools to improve farmers' access to agricultural knowledge and advice. This aligns with our project's goal of developing a digital platform that enables farmers to easily access expert guidance, agricultural insights, and real-time support through communication technologies. The approach discussed in Aker's work helps inform our development of a mobile-friendly, digital system that can empower farmers in remote areas [2].

3. AgriBot: Interactive Support for Farmers:

Sawant et al. (2019) present AgriBot, an intelligent interface designed to assist farmers with agricultural tasks through interactive features. This work is central to our project as it informs the design of a chatbot feature within our web application, allowing farmers to quickly get answers to their farming-related queries. The AgriBot's interactive nature and its ability to provide instant feedback guide our approach to making agricultural knowledge more accessible and user-friendly for farmers [3].

4. FarmChat: Conversational Agent for Farmer Queries:

Jain et al. (2018) introduce FarmChat, a conversational agent that answers farmer queries, which provides insights into creating an effective communication platform for farmers. Their research supports our project's goal of implementing a conversational agent within the web application to facilitate real-time interactions between farmers and experts. This feature is designed to foster better communication and more efficient decision-making, aligning with the needs of modern farmers seeking timely and personalized advice [4].

5. Advanced CNN Techniques for Soil Image Classification:

Lanjewar and Gurav (2022) emphasize the efficiency of CNNs for soil image classification, further reinforcing the potential of deep learning models in soil analysis. Their findings contribute to our project by guiding the integration of CNNs to improve the accuracy of soil texture classification. This advanced methodology will allow farmers to receive reliable soil assessments through our platform, enhancing their ability to make better agricultural decisions based on accurate soil data [5].

Existing Approach:

1. Development of an Interactive Agricultural Knowledge Platform: Enhancing Farmer Guidance and Sustainability

The current agricultural support systems lack a centralized, dynamic platform connecting farmers directly with agricultural experts and extension services, leaving gaps in timely access to tailored advice. This limits farmers' ability to address critical farming challenges like pest outbreaks, soil degradation, and unpredictable weather, often resulting in suboptimal decision-making and lower productivity. Existing platforms also fail to provide a real-time, curated news feed for agricultural advancements, market trends, and policy changes, which are crucial for informed farming operations. Furthermore, the absence of transparent review systems for expert advice diminishes farmers' confidence in selecting reliable experts. Sustainable farming practices are insufficiently emphasized, with limited focus on eco-friendly approaches such as crop rotation, organic fertilizers, and integrated pest management. The current systems do not holistically integrate these elements into a seamless, interactive resource that supports farmers at every step, from daily decision-making to long-term strategic planning. These limitations restrict the agricultural sector's ability to adopt sustainable, knowledge-driven practices, reducing its potential for growth and resilience.

Proposed Approach:
Agrosense AI With News Aggregator

This web-based platform is designed to be a dynamic, interactive re-source that connects farmers directly with agricultural experts and extension services, providing access to tailored advice on critical farming areas such as crop management, soil health, and sustainable practices. By facilitating direct, real-time guidance from skilled professionals, the platform empowers farmers to make well-informed, timely decisions that can positively impact crop productivity and enhance their ability to respond effectively to challenges. Whether faced with pest outbreaks, soil degradation, or unpredictable weather, farmers can consult experts who provide targeted solutions, enhancing the resilience and productivity of their farms.

To keep farmers consistently informed and prepared, the platform includes a daily agricultural news feed, which provides timely updates on industry advancements, market trends, and weather forecasts. These updates are curated to cover essential topics that influence daily farming operations and long-term strategies. Policy changes affecting agriculture are also highlighted, helping farmers understand regulatory shifts and make adjustments to align with new standards. This continuous stream of reliable information not only informs but equips farmers with the in-sights needed to anticipate changes and adapt proactively to evolving conditions within the agricultural landscape.

Aiming to build a transparent and trustworthy environment, the plat-form incorporates a customer review system, where farmers can share their experiences with experts and rate the quality of the advice received. This feedback loop creates a reliable system of peer reviews, allowing farmers to make informed decisions when selecting experts. Reviews from other farmers provide reassurance and validation, helping users confidently choose reputable experts whose advice can be trusted. This approach fosters a community of accountability and transparency, where farmers can collaborate with confidence and trust in the advice offered.

A core focus of the platform is the emphasis on sustainable farming practices, which are woven into the advice and information provided to farmers. Experts on the platform prioritize eco-friendly practices that aim to conserve resources, improve soil health, and reduce the reliance on chemical inputs. Through recommendations that promote crop rotation, organic fertilizers, and integrated pest
management, the platform guides farmers towards methods that are beneficial for the environment. This dedication to sustainable practices not only helps farmers improve their yields but also supports global initiatives for environmentally conscious agriculture, aligning local practices with broader ecological goals.

By connecting farmers with knowledgeable experts and fostering a community grounded in transparency and sustainability, this platform becomes a comprehensive resource. It serves as a space where knowledge-sharing and support are prioritized, equipping farmers with tools and insights to make sustainable, informed decisions that contribute to a thriving agricultural sector. This approach encourages farmers to engage in a knowledge-driven network, cultivating trust and promoting re-sponsible farming practices that benefit both their livelihoods and the environment. Through a supportive and collaborative community, the platform advances sustainable agriculture, supports sound decision-making, and builds a network of trust within the agricultural community.

Flow diagram:

List of modules and its working:

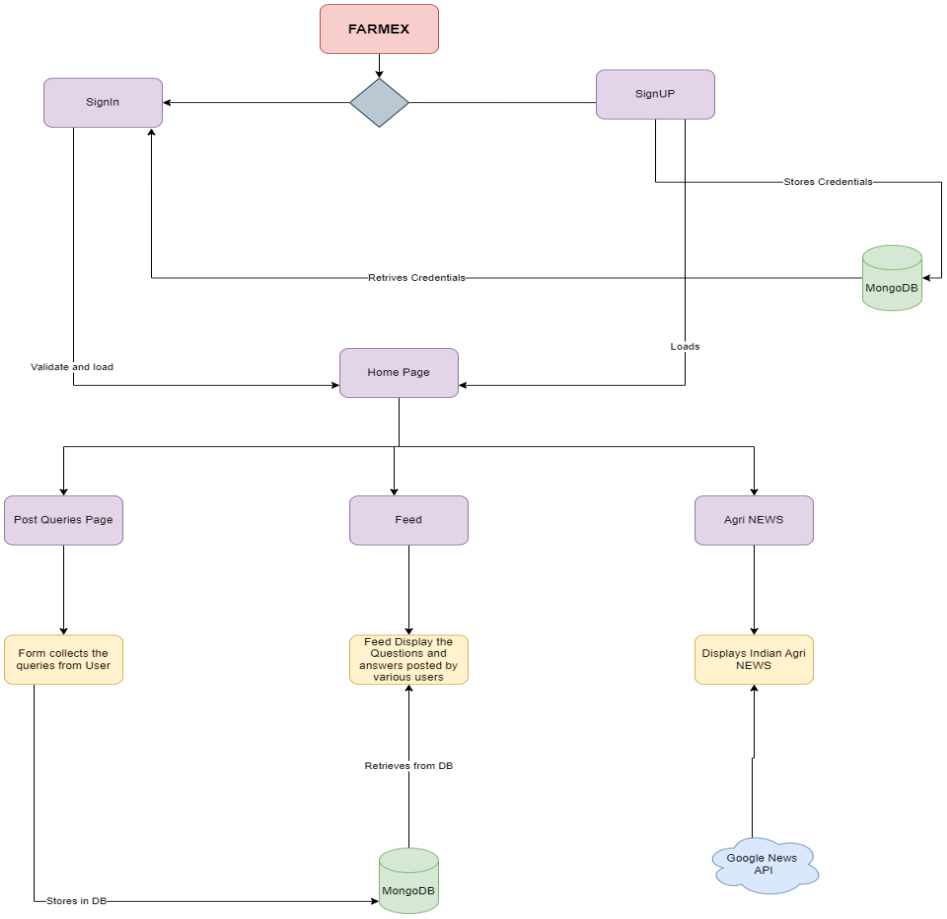
List of maintenance to ensure ongoing functionality, stability, and reliability for each module. Maintenance focus on verifying that features continue to work as expected after updates, optimizations, or changes to the application's environment.

Farmer Query Posting

Verify successful posting of farmer questions with valid data after system or database updates. Check for errors when attempting to post duplicate queries or questions with incomplete information.

Real-Time News Feed

Verify that the latest agricultural news articles and updates display accu-rately after content or database updates.



Confirm news sorting and linking functionality work as expected after al-gorithm changes or content management updates.

AI-Powered Plant Disease and Soil Texture Prediction

Test plant disease detection and soil texture assessment functionality after AI model or backend updates.

Ensure the accuracy of predictions remains consistent following algorithm optimizations or training data updates.

Language Translation

Verify that language translation functions as expected across various lan-guages after translation model updates.

Ensure that farmers can switch languages and receive accurate information without errors after UI or backend updates.

Agricultural News and Trends

Confirm the news page loads correctly, displaying current agricultural trends, news, and insights, following content or design updates.

Educational Content on Soil Texture and Crop Health

Ensure all educational resources on soil management and crop health load correctly and link properly after content or UI changes.

Expert Advice Communication

Verify that expert responses to farmer queries display accurately and are accessible to farmers following backend or data synchronization updates

Farmer Profile

Ensure user profile updates accurately with new details after backend or form field changes.

Contact Information

Verify the accuracy of displayed contact information following database or UI updates.

Certificate Form

Confirm certificate request form submissions function correctly after backend updates or form changes.

Query and Response History

Verify that posted queries and expert responses display accurately in the farmer's query history after database record updates.

Product Sorting & Filtering for Agricultural Inputs

Verify sorting and filtering for agricultural inputs work correctly after up-dates to sorting algorithms or backend changes.

Pagination

Test pagination functionality on the query feed and news pages after UI or backend changes

Result

The AgroSense AI platform successfully connected small-scale farmers with agricultural experts, offering personalized advice that led to im-proved decision-making, reduced crop losses, and enhanced productivity. Using an AI-powered soil texture prediction tool with CNN models, the platform provided accurate soil assessments, enabling resource conservation and optimized crop management. The daily news feed equipped farmers with real-time updates on weather, market trends, and policy changes, fostering proactive farm planning and risk management. Farmers also embraced sustainable practices promoted by the platform, aligning with global eco-

friendly goals. The customer review system built community trust, allowing farmers to collaborate and select reputable experts confidently. User testing confirmed the platform's intuitive design, particularly for non-typists using voice-to-text, and technical testing demonstrated reliable performance across devices. Overall, AgroSense AI has proven to be a valuable resource, blending advanced technology with community support to drive sustainable, productive, and resilient agricultural practices.

Conclusion and future work:

The AgroSense AI platform has demonstrated its potential as a valuable digital resource for small-scale farmers, enabling them to access expert ad-vice on crop management, soil health, and sustainable agricultural practices. By integrating an AI-powered soil texture prediction tool and a real-time news feed, the platform empowers farmers to make informed decisions quickly, which has been shown to increase productivity and resilience. The user-friendly interface, along with features like Google voice-to-text, facilitates ease of use for all farmers, particularly those in remote or underserved regions. Through its focus on eco-friendly practices and community-driven support, AgroSense AI aligns with global sustainability goals, helping farmers improve resource conservation while fostering a trustworthy environment for knowledge-sharing. Overall, AgroSense AI has proven to be a robust solution that bridges the gap between traditional farming practices and modern agricultural technology, supporting both economic and environmental goals. Future development of the AgroSense AI platform could include expanding the AI model to cover more crop and soil types, making it even more versatile across diverse agricultural environments. Introducing IoT integration with sensors for real-time soil and crop health monitoring would further enhance decision-making accuracy. Additional language support and localization features could make the platform accessible to a wider audience, including farmers from different linguistic backgrounds. As the community grows, incorporating blockchain technology for secure data sharing and transparent expert verification could strengthen trust among users. Continuous improvement of the CNN model's accuracy and the inclusion of more sophisticated data analytics will provide farmers with deeper in-sights, while partnerships with government and private agricultural extension programs could extend AgroSense AI's reach and impact, making it a comprehensive, long-term solution for sustainable farming.

References:

[1]. Lanjewar, M.G., Gurav, O.L. Convolutional Neural Networks based classifications of soil images. Multimed Tools Appl 81, 10313–10336 (2022). https://doi.org/10.1007/s11042-022-12200-y.

[2]. Aker, Jenny C. "Dial "A" for agriculture: a review of information and communication technologies for agricultural extension in developing countries." Agricultural economics 42.6 (2011): 631-647.

[3]. Sawant D, Jaiswal A, Singh J, Shah P. AgriBot-An intelligent interactive interface to assist farmers in agricultural activities. In2019 IEEE Bombay section signature conference (IBSSC) 12019 Jul 26 (pp. 1-6). IEEE.

[4]. Jain, Mohit, Pratyush Kumar, Ishita Bhansali, Q. Vera Liao, Khai Truong, andShwetak Patel. "FarmChat: a conversational agent to answer farmer queries." Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies 2, no. 4 (2018): 1-22.

[5]. Lanjewar, Madhusudan G., and O. L. Gurav. "Convolutional Neural Networks based classifications of soil images." Multimedia Tools and Applications 81, no. 7 (2022): 10313-10336.