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AGRICOIN: A Machine learning approach with real-time support of One-Stop Agriculture Solution for Farmers

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Abstract - "Agricoin" is an innovative platform designed to help farmers buy agricultural products while also providing them with valuable information about government schemes and expert knowledge related to farming. "Agricoin" leverages AI, data analytics, and models to offer users a seamless experience for purchasing agricultural products, including features like wishlists, cart management, order tracking, and feedback/review sharing. "Agricoin" Integration with third-party APIs to obtain government scheme information and weather data for crop recommendation. It allows farmers to quickly access information about the schemes, determine if they are eligible, and apply for them if they qualify. The platform includes information page about agriculture that leverages data analytics and machine learning models to provide farmers with valuable insights and knowledge related to farming. The platform's robust admin panel is built with advanced technologies such as database management systems and web development, enabling administrators to efficiently manage all aspects of the platform, including user accounts, product listings, and transactions.
This paper discusses the futuristic expansion services by machine learning and data-driven model that will suggest suitable crops based on environmental conditions, soil type, and weather patterns. Furthermore, incorporating data-driven models and ML into "Agricoin" has the potential to improve the accuracy of crop recommendations, optimize crop yields, and reduce the use of harmful chemicals, ultimately helping farmers make more informed and sustainable farming decisions. Our research paper gives an overview of Chatbot implementation using Natural Language Processing (NLP) and Machine Learning (ML) technologies to provide real-time support and information to users.

Keywords - AI, Data Analytics,API, Database management systems and web development, NLP, Agricultural knowledge and insights, Environmental conditions, Soil type, Weather patterns, Chatbot.

I. INTRODUCTION

The agricultural sector has witnessed remarkable technological advancements in recent years, driven by the integration of artificial intelligence (AI), data analytics, and machine learning (ML) models [5-9]. These innovations have revolutionized the way farmers engage with agricultural platforms, enabling them to access valuable information, streamline purchasing processes, and make informed decisions. "Agricoin" is one such groundbreaking platform designed to cater to farmers' specific needs.
Agricoin" leverages AI, data analytics, and ML to provide farmers with a seamless experience when purchasing agricultural products. By integrating third-party APIs, it grants farmers access to vital information about government schemes and weather data, enabling them to make informed decisions on eligibility and crop selection. Data-driven models and ML algorithms power "Agricoin" to suggest crops suitable for specific environmental conditions, soil types, and weather patterns.To enhance user support and real-time assistance, "Agricoin" incorporates a chatbot powered by Natural Language Processing (NLP) and ML technologies.

II. OBJECTIVES

- **Enhance Farmer Experience:**

The primary objective of "Agricoin" is to provide farmers with a user-friendly and seamless platform for purchasing agricultural products. The platform aims to offer features like wishlists, cart management, order tracking, and feedback/review sharing, ensuring a convenient and efficient buying experience.

- **Provide Access to Government Schemes:**

"Agricoin" aims to provide valuable information about government schemes to farmers. The objective is to enable quick access to scheme details, eligibility criteria, and application processes. By integrating with third-party APIs, the platform facilitates the retrieval of government scheme information, helping farmers determine their eligibility and apply for relevant schemes.

- **Deliver Expert Knowledge:**

The platform intends to offer expert knowledge and insights related to farming through an information page dedicated to agriculture. By leveraging data analytics and machine learning models, "Agricoin" aims to provide farmers with valuable information, recommendations, and knowledge that can assist them in making informed decisions and improving their farming practices.

- **Improve Crop Recommendations:**

The proposed research discussed in the paper focuses on the expansion of services using machine learning and data-driven models. The objective is to develop a crop recommendation system that suggests suitable crops based on environmental conditions, soil type, and weather patterns. By incorporating data-driven models and ML into "Agricoin," the platform aims to improve the accuracy of crop recommendations, optimize crop yields, and promote sustainable farming practices by reducing the reliance on harmful chemicals.

- **Implement Chatbot Support:**

The research paper also introduces the implementation of a chatbot using NLP and ML technologies. The objective is to provide real-time support and information to users, specifically farmers. By leveraging NLP and ML, the chatbot aims to understand user queries and provide relevant and timely assistance, enhancing the overall user experience and accessibility of information.

Overall, the objectives of "Agricoin" revolve around improving the farmer experience, providing access to government schemes and expert knowledge, enhancing crop recommendations, and implementing a chatbot for real-time support. These objectives aim to empower farmers with valuable resources, promote informed decision-making, and contribute to sustainable and efficient farming practices.

III. NEED

"Agricoin" hold several significant needs and benefits in the agricultural domain.

- **Empowering Farmers:**

The project aims to empower farmers by providing them with a comprehensive platform that caters to their needs. By offering seamless access to agricultural products, government schemes, expert knowledge, and real-time support, the project addresses the specific requirements of farmers and assists them in making informed decisions.

- Bridging Information Gap:

The research and project fill the information gap that often exists in the agricultural sector. By leveraging AI, data analytics, and machine learning, the platform provides valuable insights and recommendations to farmers, helping them overcome challenges related to crop selection, government schemes, and farming techniques. This addresses the lack of easily accessible and reliable information, empowering farmers to make better choices.

- **Sustainable Farming Practices:**

By incorporating data-driven models and ML into "Agricoin," the project focuses on promoting sustainable farming practices. The crop recommendation system considers environmental conditions, soil type, and weather patterns to suggest suitable crops. This aids in optimizing crop yields, reducing the use of harmful chemicals, and enhancing the overall sustainability of farming operations.

- **Efficient Government Scheme Access:**

  The integration of third-party APIs to obtain government scheme information streamlines the process for farmers to access and apply for relevant schemes. This addresses the need for a centralized and efficient platform that provides farmers with up-to-date information about government initiatives and simplifies the application process.

- Enhanced User Experience:

The project prioritizes delivering an enhanced user experience for farmers. Through features like wishlists, cart management, order tracking, and feedback/review sharing, "Agricoin" aims to provide a user-friendly platform that simplifies the purchasing process and encourages user engagement. The

chatbot implementation further adds real-time support and assistance, ensuring that farmers have access to information whenever they need it.

- **Agricultural Sector Modernization:**

By leveraging advanced technologies such as AI, data analytics, and machine learning, the project contributes to the modernization of the agricultural sector. It embraces digital solutions to streamline processes, improve decision-making, and enhance productivity, paving the way for a more efficient and technology-driven agricultural industry.

IV. PROPOSED METHODOLOGY

The proposed methodology for "Agricoin" involves several key steps to create a comprehensive and effective platform for farmers. The first step is data collection, where information on government schemes, weather conditions, historical climate data, and soil characteristics is gathered from various sources. This data is then integrated into the system, ensuring compatibility and standardization for further processing. Next, machine learning (ML) models are developed using the collected data. These models utilize techniques such as supervised learning and regression analysis to suggest suitable crops based on environmental conditions, soil type, and weather patterns. Feature engineering is performed to extract meaningful features from the input data, optimizing the performance of the ML models. The ML models form the core of the crop recommendation system in "Agricoin". Farmers provide inputs such as location, soil type, and weather conditions, and the system generates personalized crop recommendations based on historical data, weather forecasts, and soil analysis. These recommendations prioritize sustainable farming practices and aim to reduce the use of harmful chemicals, helping farmers make more informed decisions. In addition to the crop recommendation system, "Agricoin" also incorporates a chatbot powered by natural language processing (NLP) and ML technologies. This chatbot acts as a virtual assistant, capable of understanding user queries, providing real-time support, and offering relevant information. It combines rule-based approaches and ML algorithms to deliver accurate responses and assist farmers with their farming-related inquiries. To ensure the effectiveness and accuracy of the ML models and chatbot, a rigorous evaluation and validation process is conducted. The crop recommendation system is validated against known successful farming practices and expert recommendations. User feedback and reviews are collected to gauge user satisfaction and identify areas for improvement, leading to continuous enhancements of the system. The ML models and chatbot are seamlessly integrated into the existing "Agricoin" platform, allowing for smooth communication and interaction with users. Thorough system testing is conducted to ensure proper functionality and performance before deployment. Overall, the proposed methodology for "Agricoin" encompasses data collection, ML model development, the implementation of a crop recommendation system, chatbot integration, evaluation and validation, and continuous improvement based on user feedback. By leveraging AI, data analytics, and ML technologies, "Agricoin" aims to provide farmers with a comprehensive and user-friendly platform that supports sustainable farming practices and enhances their overall farming experience.

V. PROPOSED OVERALL MODEL

1. Data Collection and Integration:

The first step in our methodology involves collecting relevant data from various sources. This includes government schemes data, weather data, historical climate data, and soil characteristics. We will integrate third-party APIs to obtain real-time information on government schemes and weather conditions. The collected data will be pre-processed and standardized to ensure compatibility with the ML models.

2. ML Model Development:

To suggest suitable crops based on environmental conditions, soil type, and weather patterns, we will develop ML models. These models will be trained using the collected data, leveraging techniques such as supervised learning and regression analysis. We will employ feature engineering to extract meaningful features from the input data and optimize model performance. Multiple ML algorithms will be evaluated to identify the most accurate and efficient model.

3. Crop Recommendation System:

The developed ML model will form the basis of the crop recommendation system in "Agricoin." The system will take inputs such as location, soil type, and weather conditions from farmers and provide personalized crop recommendations. It will consider historical data, weather forecasts, and soil analysis to suggest crops that are likely to thrive in the given conditions. The system will prioritize sustainable farming practices and reduce reliance on harmful chemicals.

4. Chatbot Implementation:

The proposed chatbot will be implemented using NLP and ML technologies. It will utilize a combination of rule-based approaches and ML algorithms to understand user queries, provide real-time support, and offer relevant information. The chatbot will be trained on a corpus of agricultural data and user interactions to improve its understanding and response accuracy over time. It will integrate with the existing "Agricoin" platform, enabling farmers to seek assistance and receive immediate responses

5. Evaluation and Validation:

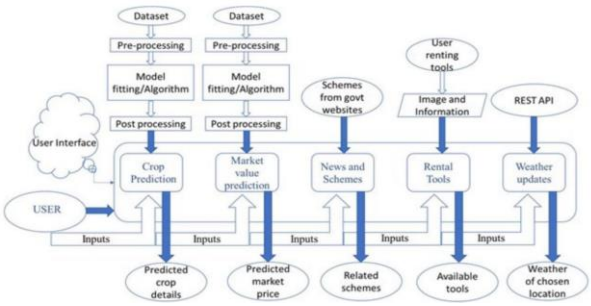
To assess the effectiveness and accuracy of the developed ML models and chatbot, a rigorous evaluation process will be conducted. The crop recommendation system will be validated against known successful farming practices and expert recommendations. The chatbot's performance will be evaluated based on its ability to understand user queries, provide accurate responses, and handle various scenarios. User feedback and reviews will also be collected to gauge user satisfaction and identify areas for improvement.

6. Integration and Deployment:

Once the ML models and chatbot have been thoroughly tested and validated, they will be integrated into the existing "Agricoin" platform. This involves ensuring seamless communication between the components, setting up appropriate APIs, and conducting thorough system testing to ensure proper functionality. The integrated system will be deployed on a scalable infrastructure, capable of handling increasing user demands and maintaining high performance.

7. Continuous Improvement:

To keep up with evolving agricultural practices and user needs, continuous improvement of the system is crucial. Feedback from farmers and users will be actively collected and analyzed to identify areas of enhancement. Regular model retraining and updates will be performed to incorporate new data and improve the accuracy of crop recommendations. The chatbot's performance will be continuously monitored and refined to provide an optimal user experience.



Flowchart of the proposed system.

VI. DECISION TREE ALGORITHM

The decision tree algorithm can be used as part of the ML model development process in the proposed model for "Agricoin." Here is a simplified representation of the decision tree algorithm for crop recommendation:

- Start: Gather input data such as location, soil type, and weather conditions.
- Splitting Criteria: Determine the best attribute (feature) to split the data based on information gain or Gini index. Possible attributes could include temperature, rainfall, soil pH, nutrient levels, etc.

- Split Data: Divide the dataset into subsets based on the selected attribute and its possible values. For example, if the temperature is the selected attribute, divide the data into subsets for different temperature ranges.
- Recursive Process: Recursively repeat steps 2 and 3 for each subset created in the previous step until a termination condition is met. Termination conditions could include reaching a maximum depth, achieving a minimum number of samples in a leaf node, or meeting a specific purity threshold.
- Assign Labels: Assign labels to the leaf nodes of the decision tree based on the majority class or most common crop recommendation within that subset.
- Prediction: Given a new set of input data, traverse the decision tree based on the attribute values to reach a leaf node. The label assigned to that leaf node represents the predicted crop recommendation.
- End.

REFERENCES:

[1] Mrs. Shila Jawale , Athang Bhadhakar Rohan Chaudhari , Siddhi Malave , Naman Bagadia," AGRI-CARE – One Stop Solution for Modern Farming and Agriculture" International Journal for Research in Applied Science & Engineering Technology (IJRASET)

[2] Sanjay S Tippannavar, Yashwanth S D,Gagana C, Meghana M, Gautami J, Pooja Konnur,"AGROPEDIA - One Stop for all Agricultural Needs" IJIRAE:: International Journal of Innovative Research in Advanced Engineering ISSN: 2349-2163 Volume 10, Issue 03, March 2023

[3] https://farmer.gov.in/

[4] https://en.wikipedia.org/wiki/Agriculture

[5]. Sanjay Kumar Suman, Dhananjay Kumar and L. Bhagyalakshmi, "SINR pricing in non-cooperative power control game for wireless ad hoc network", KSII Transactions on Internet and Information Systems, KSII TIIS, vol. 8, no. 7, pp. 2281-2301, 2014.

[6]. L. Bhagyalakshmi, Sanjay Kumar Suman, Sujeetha Devi, "Joint Routing and Resource Allocation for Cluster Based Isolated Nodes in Cognitive Radio Wireless Sensor Networks", Wireless Personal Communication, Springer, vol. 114, issue 4, pp. 3477- 3488, 2020.

[7]. K. Mahalakshmi, K. Kousalya, Himanshu Shekhar, Aby K. Thomas, L. Bhagyalakshmi, Sanjay Kumar Suman et. al., Maintaining data integrity in distributed cloud storage using public auditing scheme, Scientific Programming, Hindawi, Vol 2021, 2021.

[8]. Sanjay Kumar Suman et. al., Detection and prediction of HMS from drinking water by analysing the adsorbents from residuals using deep learning, Hindawi (SAGE Journal) Adsorption Science & Technology, vol. 2022, 2022. Article id 3265366.

[9]. Bhagyalakshmi and K. Murugan, "Avoiding Energy Holes Problem using Load Balancing Approach in Wireless Sensor Network", KSII Transaction on Internet and Information Systems, Vol. 8 , No. 5, pp. 1618- 1637, 2014.