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SYNOPSIS

1.	**Reference No: 46S_BE_2724**
2.	**Project Title: Areca Mitra - Mobile Application to detect arecanut disease using Machine Learning.**
3.	**Name of the College: Vivekananda College of Engineering and Technology, Puttur.**
4.	**Department: Computer Science and Engineering**
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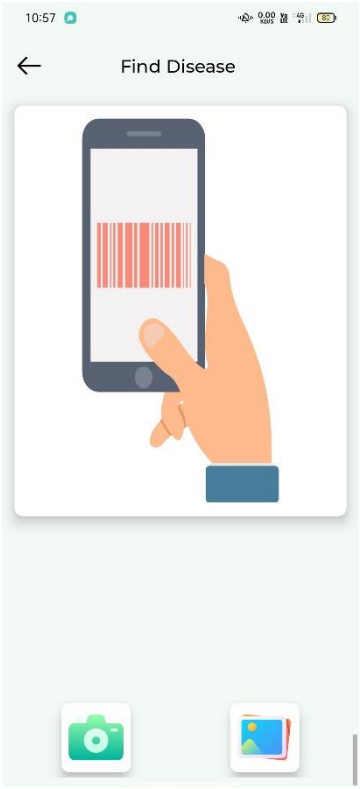
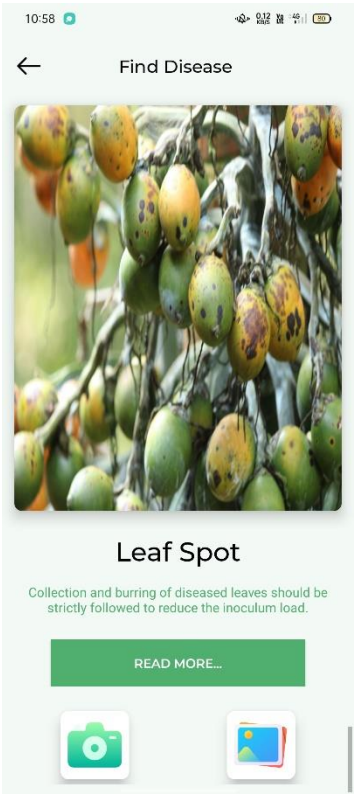
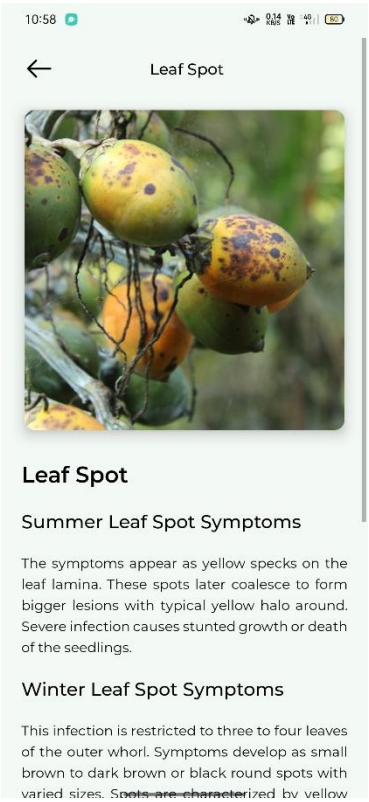
9.	**Keywords:** Arecanut; Convolution Neural Network; Classification
10.	**Introduction:** Arecanut is a tropical crop, which is popularly known as betel nut. India ranks second in producing and consuming arecanut in the world. Throughout its life cycle, it is affected by a variety of diseases, from root to fruit. We conducted extensive research, consulting with agriculture experts, exploring existing technologies, and analysing data on diseases that can impact areca nut plants. This helped us shape our approach to leveraging modern technologies to help farmers identify diseases and provide remedies. We devised a plan to develop a mobile app ArecaMitra, which is a mobile application developed to detect diseases in the areca nut plant using machine learning techniques. The application aims to provide an efficient and accurate solution for farmers and agricultural experts to identify and diagnose diseases affecting areca nut crops. The models were trained using a large dataset of labeled images, representing different diseases and healthy areca nut plants. The training process involved extracting relevant features from the images and using them to classify the plants as healthy or diseased. Once the disease detection model was developed, the focus shifted to designing and developing the Areca Mitra mobile application. The application was built with a user-friendly interface, allowing farmers and agricultural experts to easily capture images of their areca nut plants and receive instant disease diagnosis. The app also provided additional information on the detected diseases, including preventive measures and treatment options. Overall, the Areca Mitra project combines the power of machine learning and mobile technology to provide an innovative solution for detecting diseases in areca nut plants. The application aims to assist farmers in timely disease management, ultimately improving crop yield and ensuring sustainable agriculture practices in the areca nut industry.
11.	**Objectives of the project:** One of the significant crops grown in the coastal areas of Dakshina Kannada is the arecanut, which has a healthy market. However, this year's crop of areca nuts has seen an increase in a number of diseases, none of which currently have a permanent treatment as a result, production has dropped

	by half. The agricultural scientists from CPCRI and other institutions have conducted a wide range of investigations. According to agricultural scientists, growers are not adequately informed about the disease. The current approach for detecting diseases is simply observation with the naked eye and farmers have to carefully analyze each and every crop periodically to detect the diseases. Using convolutional neural networks, we suggested a smartphone application system that aids in the detection of diseases affecting areca nuts, their leaves, and their trunk and offers remedies by uploading images of the affected leaves or roots.
12.	**Methodology:** The project is divided into Three parts: ● Dataset Collection. Arecanut disease incidence recordings for any region are not available in the public repository. We have collected datasets from different regions like Paivalike, Sullia, Badiadka. We found that at Paivalike, Sullia, Badiadka plants were affected with diseases such as scale insect, red palm weevil, inflorescence die-back, bud rot, anabe roga, mite, and leaf spot and stem bleeding respectively. We collected around 1200 photographs of diseases affected arecanut plants and individual images have only one disease. So the information related to disease data is taken from ICAR-Central Plantation Crops Research Institute, Vittal. ● Training a neural network model for the prediction of plant diseases.  The next phase involves developing a machine learning model that can accurately identify arecanut diseases. The gathered image of the leaf, fruit and root is transformed to an array and used as input by the CNN-trained model. We will use convolutional neural networks (CNN) for image recognition and classification, and transfer learning techniques to improve model performance. TensorFlow library will be used for model development and training, and the model's performance will be evaluated using the confusion matrix and accuracy metrics. ● Mobile Application Development The final phase of the project is developing a user-friendly mobile application that can identify arecanut diseases and provide relevant information and

	remedial measures to farmers. The app will have a simple and intuitive interface, allowing farmers to capture and upload images of affected leaves. The machine learning model developed in the previous phase will be used to identify the disease and provide users with relevant information. Additional features such as market rates and agriculture officer information will also be included in the app.
13.	**Results:** **Home screen:** The app's home screen shows real-time weather and has options like finding diseases, arecanut market prices, information about various diseases in arecanut plants, and agriculture officers' numbers. **Find Disease screen:** This screen has an option to capture and upload images, which helps the app show the diseases and their remedies. **Remedies screen:** After diagnosing the disease, the app will display a customized list of remedial solutions and treatment recommendations for the specific disease. **Disease Info screen:** This screen contains a list of diseases present in arecanut and their remedies. **Call Nearest Centre screen:** This screen contains agriculture experts' number so that user can contact directly to know more identified disease.    **Conclusion:** Our project utilizes deep learning, specifically the Convolutional Neural Network (CNN) algorithm, to detect diseases in areca plants. The CNN model was trained on a dataset of images representing eight different diseases

	affecting areca plants. Our approach successfully recognizes these diseases and we have developed an app with a user-friendly interface. Farmers can upload images of their crops to the app for analysis, which provides a detailed description of the identified disease. This feature is especially beneficial for farmers who may not be familiar with scientific names. Overall, our method serves as a valuable tool for areca farmers to quickly and accurately detect and diagnose diseases. This helps prevent disease spread, increases crop yield, and enhances profitability.
14.	**Scope for future work:** The Arecamitra-mobile application for arecanut disease detection using machine learning has great potential for future enhancements. One possible direction for future development is to incorporate more disease detection models into the app to improve its accuracy and reliability. This could involve using different types of models, such as deep learning, to detect rare or complex diseases. Another possibility is to enhance the user experience by making the app more user-friendly and intuitive, adding more features such as a chatbot for real-time communication and a forum for communication among farmers, and adding different languages for instructions. Additionally, the app's scope could be expanded to cover other crops and their diseases, making it more versatile and valuable to farmers. Integrating the app with IoT sensors to detect environmental factors such as humidity, temperature, and rainfall could provide more accurate predictions of disease outbreaks and help farmers take proactive measures to prevent disease. Finally, a cloud-based data management system could be implemented to improve the scalability of the app, allowing it to store and process large amounts of data efficiently and effectively, enabling it to handle a higher volume of users and data.