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A Survey on Ayurvedic Plant Identification Using Augmented Reality

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Abstract: Identification of ayurvedic plants that go in the medicinal uses and are beneficial to human health is very important. Recognizing an ayurvedic plant is not evidently known to many people, but identifying these plants can help the user to learn and understand more about the ayurvedic plants. The main features required to identify an ayurvedic plant, are its leaf shape, leaf size, color and texture. The database of the ayurvedic plants is created by scanning the leaves. Our project provides a way to identify these plants using the image processing technique, with the help of markers. The markers are used to identify the pattern of the leaves and a corresponding AR model will be superimposed. It will be an interactive learning method that makes an effective way to identify the ayurvedic plants and show their uses.

Keywords: Plant identification; Ayurveda; Features; Markers; Augmented Reality; Interactive learning.

I. INTRODUCTION

Ayurveda is an ancient medicine system with historical roots in the Indian subcontinent. *Ayurveda* is becoming increasingly popular, which can be used to treat many chronic diseases with people responding to *Ayurvedic* medicine well. So, it is absolutely essential to correctly identify these plants to obtain benefits. The notion of detecting plants based on photos or videos is referred to as plant detection. There are several methods for detecting ayurvedic plants. A plant recognition system is a technology that can match a leaf from a reference picture or video to a database of leaves based on its color and pattern. Augmented reality (AR) is a technique that includes superimposing audio, visual or other receptive data on the actual environment to improve one's experience. The technology used in the proposed system is Vuforia SDK, implemented in Unity platform, this plays a major role and it recognizes and tracks planar pictures and 3D objects in real time using computer vision technologies. Our objective is to build a mobile application that helps the user to identify the ayurvedic plants in an easier way. This is a system that would help the user to identify the plant by fetching the AR model of the plant from the database. AR model gives superimposed images of virtual graphics (3D) three-dimensional images, and area captured by AR camera. The application helps the user view the 3D model of the ayurvedic plant and its uses. The system applies plant detection and leaf recognition algorithm to the snaps of leaves taken by the user and shows the medicinal uses of that particular ayurvedic plant.

Plant's data along with its AR model is stored initially with the detected leaves of a plant. User takes snaps of the leaves from the application after which it applies plant detection and leaf recognition algorithms in Vuforia SDK and gives a super imposed model of the recognized plant. Since the database already contains the markers of the plant as well as their corresponding pre-built AR models. Proposed system is being intended in such a way that the user can have a view of the plant's 3D AR model and its medicinal uses simultaneously.

II. LITERATURE SURVEY

[1] This system proposed a novel and robust technique for identifying rare medicinal plants using CNN. Medicinal plants were detected with great accuracy by utilizing image processing and machine learning in this system. Scanned photos of flowers and leaves were used to establish a database, with both the back side as well as the front sides of the flowers and leaves collected and archived. Tensor flow was used on the datasets to classify the plants based on the unique feature combination, and test accuracy of 90% was achieved.

[2] The topic of this research paper is FCNN (Fourier Convolutional Neural Network). Anaconda, Python, and TensorFlow are used to generate a dataset, which is then used to create a 3D model using Unity and a Sinhala virtual assistant. The Sinhala virtual assistant can aid the user and the application in developing a more natural relationship. This application provides the best exam accuracy and leads users down the proper route with the assistance of the virtual assistant.

[3] They have presented a novel approach to the development of an AR system for improving productivity and efficiency in offshore plant construction in this research. The fundamental contribution of this study is to create a viable AR solution that may be used in a variety of sectors, including construction. The proposed augmented reality technology assists users in reaching their destination on their own. This approach enables users to execute installation and inspection utilizing AR 4D visualization functions, allowing them to effectively supervise the fabrication process and respond to issues via AR scene sharing and an e-mailing system when issues are discovered.

[4] They exhibited prototypes of a mobile-augmented reality electronic field guide as well as several ways for representing and assessing computer vision-based virtual vouchers in this study. The specimens were identified and collected utilizing a tangible AR user interface based on visual features, location, and seasonal traits. Another user interface is being developed that offers a hands-free, head-movement-controlled AR that supports look-and-lock techniques for detail inspection. The orientation of a hand-held computer that controls the user interface is the basis for a third user interface. In an electronic field guide, these new techniques were investigated for providing visual search results and inspection virtual vouchers (EFG).

[5] The fundamental benefit and significance of the suggested approach given in this paper is that plant species may be identified using leaf features utilizing a machine learning algorithm, which saves time and makes plant identification easier. They have extracted and enhance images using image processing methods, converting them into usable information that which is then processed using a Support Vector Machine classifier for classification and accuracy. The experimental results back up the proposed method's superiority. The proposed methodology was tested on a variety of sample leaf photos from various species, with a positive result in the majority of cases.

[6] The SRM urban farm center of SRM IST, Faculty of Agriculture Science, provided the raw picture data for this study. Leaf samples that were sick were also collected. A plant pathology specialist from SRM agriculture science supported in the collecting of acceptable ill plant photo samples for data collection. The data are pre-processed in the AR HMD unit before being analyzed using a Convolution Neural Network in the cloud module (CNN). The preprocessing method for ROI identification and segmentation is employed. This study looks at how an on-field farmer may use IoT-enabled equipment to diagnose plant diseases. By merely staring at the plant with the AR HMD gadget, this cloud-based AR technology will give crucial plant disease diagnosis.

[7] This paper presents us with a chatbot that is it is a virtual assistant. Many individuals are unfamiliar with native medicinal herbs and ayurvedic treatment procedures. To avoid these problems this chatbot is designed with centralized data. The chatbot analyzes the questions asked by the users and will provide answers accordingly to that. Many individuals are unfamiliar with native medicinal herbs and ayurvedic treatment procedures. To mimic human conversations the chatbot uses an artificial intelligence program. This technology also has the capability of providing vital information of ayurvedic physicians. Users may discover doctors quickly and conveniently with the use of this essential information. By this trust for the user's problem to be solved is increased. To conclude this model provides 90% test accuracy. The accuracy of identifying rare plants can be increased by a greater number of trainings. Accuracy can be increased by taking different datasets and training the model many times.

[8] This project mainly concentrates on identifying the medicinal plants by the leaf's color, shape and texture. As these leaves contain different parameters like color and texture from both the sides this can used in identifying the species. The identification of correct plants is important as wrong medicines can only increase the disease. To create this collection of medicinal plant leaves, scanned photos of the front and back sides of leaves of commonly used ayurvedic medicinal plants were employed. As every leaf has unique combination feature this can be used to classify these leaves. When different datasets were used and tested the identification rates were up to 99%. Later the model is extended to identify dry leaves and obtain feature vectors using which identification rates can be further increased. Green leaves are more easily distinguished when they exhibit unique and diverse combinations of color, morphological, and textural features. The future work would be taking more samples of leaves and propose methods to even identify tiny leaves. By this identification of tiny leaves would also be efficient.

[9] This study proposes a system model for obtaining knowledge about plants by clicking on photos of plants. They used augmented reality technology to show information modules on the current system. With the help of this module, they can scan specific plant and obtain its 3D model and text information in real time. Once the 3D model is displayed the users can interact with the 3D model by rotating and scaling it by which their knowledge will be enhanced and it gives a little more edge on their learning interests. This system model is implemented using computer vision-based AR and geographic location-based AR. Both these technologies are integrated together to achieve this model. AR technology is used with already existing plant knowledge in this article to enhance the learning system in plant studies utilizing the display module.

[10] This research describes how texture analysis of the photos was used to establish a system for identifying and classifying medicinal plants from their leaf photographs. Based on the textural properties of the query image, the program selects and delivers the closest match from the database. The texture properties discovered through texture analysis are then evaluated separately on test leaves to determine which are the most effective. The success rate is calculated using a combination of these textural properties for categorization. By comparing medical leaves to a database of leaves, this model proposes and implements a method for automatic identification of medical leaves. The texture feature is utilized to compare the two. This method has a 94 percent

accuracy rating.

[11] This paper describes a statistical method for identifying plants. The proposed method has been tested on two datasets with a total of 12 plants. For classifying leaf images, it employs a Euclidean classifier. In comparison to other ways, this approach is simple to implement and execute. The precision is moderate. Accuracy can be improved by using. Using other advanced classifiers and adding more statistical features However, due to the algorithm's complexity, it will slow down the execution speed if you increase it. As a result, this strategy provides the best compromise between speed and efficiency. To gather plant characteristics, the leaf is chosen from among all accessible plant parts. Using digital image processing techniques, five geometrical parameters are determined. Six fundamental morphological traits are extracted using these geometrical factors. Leaf structure is used to extract a vein feature as a derived feature. The developed method is put to the test in terms of recognition accuracy. On two separate datasets, the algorithm's accuracy is evaluated and compared. For both databases, the erroneous acceptance and rejection ratios are computed. Because it is independent of leaf maturity, this technique uses an effective algorithm for plant identification and categorization.

[12] This research developed a plant identification system that recognizes plants based on images of their leaves. Users may also picture leaves and send them to a server using a smartphone application. Before a pattern matcher compares the information in the image to the information in the database to discover likely matches, the server performs pre-processing and feature extraction techniques to the image. The leaf's length and width, its area, its perimeter, the hull's area and perimeter, a distance map along the vertical and horizontal axes, a color histogram, and a centroid-based radial distance map are all obtained.

III.EXISTING SOULTION

In recent years, software engineering research, notably image processing and example recognition processes, has been used to plant scientific classification to compensate for people's lack of ID abilities. The papers introduced in the literature study utilize distinctive leaf and plant identification strategies. The k-Nearest Neighbor classifier was built and tried on leaves from various plant types. In this, the length and expansiveness of the leaf, the region of the leaf, the edge of the leaf, the frame region, the body border, a distance map along the vertical and flat tomahawks, a shading histogram, and a centroid-based outspread distance map are completely recovered. Plant species are recognized utilizing leaf highlights using an AI calculation. Ordering of leaf pictures is additionally finished by Euclidean classifier as this methodology is straightforward and simple to carry out. New methods, for example, electronic field guide (EFG) was examined for giving visual indexed lists and examination of virtual vouchers. A few best-in-class techniques utilizes profound learning-based strategies for plant species distinguishing proof. Profound learning-based strategies utilizes profound learning calculations like convolutional neural organization (CNN) to remove includes and group leaf images. The expanded reality (AR) innovation is utilized to show the data module. With the assistance of this module, they can examine explicit plant and get its 3D model and text data in genuine time. This framework model is carried out utilizing PC vision-based AR and geographic area-based AR. Both these advances are coordinated together to accomplish the ideal AR model.

IV. PROPOSED SOULTION

Our project aims to identify an ayurvedic plant and returns an 3D AR model of the corresponding plant with its benefits. The images of plant's leaves are taken from both front and back side and from all the different angles. These images are stored in the database and are fetched once plants are scanned. A 3D model representation of plant is generated using the images in the database. The Vuforia SDK identifies the leaves using trackers and creates a pattern. Later which is used to develop the 3D model. Once the markers are detected by the software, it triggers the AR element and a corresponding 3D AR model of the plant is displayed on the screen with its uses along with a text to speech mechanism.

System Architecture

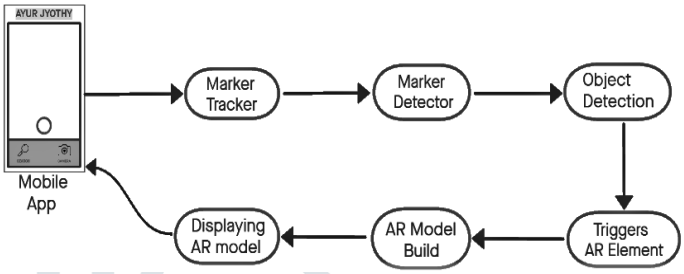

Fig 1 : Project Workflow

V. CONCLUSION

For beginners, traditional plant identification is difficult, time consuming, and irritating. This poses a difficult barrier for novices interested in learning about species. There is a requirement for an automated plant identification system. The goal is to make the process easier by using a mobile application. This work focuses on identifying ayurvedic plants using image analysis and creating a matching 3D representation of the plant using augmented reality. As soon as the user snaps a photo of the plant, all of the data is sent into the program, and 3D models of the plant, as well as its medical purposes, are fetched. The system's resources will be compatible with the most recent technology on the market. Our implementation of the application will make the learning interactive and informative for the user.

VI. REFERENCES

[1] A.D.A.D.S. Jayalath, T.G.A.G.D Amarawanshaline, D. P. Nawinna,P.V.D. Nadeeshan,H.P Jayasuriya , "Identification of Medicinal Plants by Visual Characteristics of Leaves and Flowers" https://www.researchgate.net/publication/337534280 (Dec 2019).

[2] L. P. D. S Senevirathne,D. P. D. S Pathirana,A. L. Silva,M. G. S. R Dissanayaka,D. P. Nawinna,D. Ganegoda, "Mobile-based Assistive Tool to Identify & Learn Medicinal Herbs" https://www.researchgate.net/publication/346034192 (Dec 2020).

[3] Sungin Choi and Jung-Seo Park,"Development of Augmented Reality System for Productivity Enhancement in Offshore Plant Construction", J. Mar. Sci. Eng. 2021, 9, 209. https://doi.org/10.3390/jmse9020209.

[4] Sean White,Steven Feiner,Jason Kopylec, "Virtual Vouchers: Prototyping a Mobile Augmented Reality User Interface for Botanical Species Identification" ,3DUI 2006 (IEEE Symp. on 3D User Interfaces), Alexandria, VA, March 25-26, 2006, pp. 119-126

[5] Ibaphyrnaishisha Kharir,Vikaho Z Swu,Dibya Jyoti Bora, "Identification of Different Plants through Image Processing Using Different Machine Learning Algorithms", UGC Care Journal,November-December (2020)

[6] Vijayakumar Ponnusamy,Sowmya Natarajan,Nandakumar Ramasamy,Christopher Clement,Prithiviraj Rajalingam, Mitsunori, "An IoT- Enabled Augmented Reality Framework for Plant Disease Detection", https://doi.org/10.18280/ria.350301, 12 June 2021.

[7] A.D.A.D.S. Jayalath, P.V.D. Nadeeshan, T.G.A.G.D Amarawansh, H.P Jayasuriya, D. P. Nawinna, "Ayurvedic Knowledge Sharing Platform with Sinhala Virtual Assistant", 2019 International Conference on Advancements in Computing (ICAC)December 5-6, 2019. Malabe, Sri Lanka.

[8] Manojkumar P., Surya C. M., Varun P. Gopi, "Identification of Ayurvedic Medicinal Plants by Image Processing of Leaf Samples", ICRCRCN (2017).

[9] Gang Zhao, Qing Zhang, Jie Chu, Yaxu Li and Shan Liu, Luyu Lin,"Augmented Reality Application for Plant Learning", 978-1-5386 -6565-7/18/S31.00 ©2018 IEEE

[10] T. Sathwik, R. Yasaswini,Roshini Venkatesh1, A. Gopal,"Classification of Selected Medicinal Plant Leaves Using Texture Analysis", 4th ICCCNT - 2013, July 4 -6, 2013, Tiruchengode, India.

[11] Sachin D. Chothe, V.R.Ratnaparkhe,"Plant Identification Using Leaf Images",Special Issue 6, IJIRSET, May 2015.

[12] Trishen Munisami,Mahess Ramsurn,Somveer Kishnah,Sameerchand Pudaruth,"Plant leaf recognition using shape features and colour histogram with k-nearest neighbour classifiers",under the CC BY-NC-ND license (2015).