AI-Powered Medicinal Plant Identifier with Intelligent Wellness Assistant and Ayurvedic Remedy Recommendation System

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Abstract - **Ayurveda is one of the oldest holistic healthcare traditions in the world and is based largely on medicinal plants for the prevention, diagnosis, and treatment of diseases. However, despite its rich history and success rate, the proper identification and utilization of medicinal plants remain a challenge for the masses because of a lack of specialists, gaps in local knowledge, and inadequate online resources. Recently, artificial intelligence has been identified as a promising solution for dealing with difficult real-world issues in the fields of healthcare and agriculture. This paper proposes an intelligent system that combines image classification using deep learning with a conversational AI assistant for the identification of medicinal plants and the provision of authentic Ayurvedic knowledge and home remedies. The system uses a convolutional neural network that is trained on images of medicinal plants for their proper identification, and a chatbot interface allows for an interactive and user-friendly way of accessing information on the benefits, uses, and cautions related to medicinal plants. The proposed method aims to improve the availability of traditional knowledge, increase awareness about herbal medicine, and help in the digital preservation of Ayurvedic knowledge.**

Keywords - Medicinal Plants, Ayurveda, Deep Learning, Convolutional Neural Networks, Image Classification, Chatbot, Internet of Things, Healthcare Technology

1. INTRODUCTION

Medicinal plants have always been an essential part of traditional medicine practices such as Ayurveda, Unani, and Siddha. Ayurveda originated in India and focuses on natural healing methods using herbs, roots, leaves, and extracts of plants to achieve harmony between the body, mind, and environment. But the identification of medicinal plants is not that simple, and improper identification can result in ineffective treatment or even be harmful to health. In today's modern world, urbanization has resulted in a lack of transfer of traditional knowledge from one generation to another.

With the advent of artificial intelligence, especially in deep learning and computer vision, automated plant identification has become possible and highly efficient. At the same time, conversational AI tools make it possible to have an interactive and personalized way of sharing knowledge in a particular domain. By combining these tools, the proposed system provides an intelligent platform that helps users identify medicinal plants and their importance in Ayurvedic medicine in a simple and intuitive way.

2. BACKGROUND AND DOMAIN OVERVIEW

Ayurveda is a comprehensive medical practice that focuses on the prevention and sustainable health of an individual. Herbal medicine is the backbone of Ayurvedic medicine, and each herb has its own unique properties. Despite the increasing popularity of herbal medicine worldwide, the availability of authentic and organized knowledge about Ayurvedic medicine is limited, especially among the general public. The digital revolution in the medical field offers a chance to fill this gap.

Artificial intelligence-based systems have shown encouraging results in healthcare analytics, medical imaging, and decision support systems. Leveraging these technologies in Ayurveda not only brings about a modernization of traditional systems but also helps in protecting the knowledge and making it scalable. The convergence of AI-based plant identification and interactive knowledge systems can greatly help in learning, awareness, and proper usage.

3. PROBLEM STATEMENT

There is a need for systems that are available, reliable, and intelligent enough to provide information about medicinal plants and Ayurvedic information interactively. The existing systems are either dependent on manual identification by experts or provide static text resources that do not allow interaction with the user.

This limitation reduces accessibility, scalability, and practical usability for common users.

4. OBJECTIVES

The main aims of this research work are to develop a system for the identification of medicinal plants using deep learning, to develop an interactive conversational assistant that can provide knowledge and basic information about home remedies, to increase the availability of traditional medicinal information, and to create awareness about the conservation of

medicinal plant resources..

5. RELATED WORKS

In the earlier studies on the identification of medicinal plants, the focus was on the traditional image processing methods that used hand-crafted features like leaf shape, texture, color histograms, and vein patterns. These features were combined with traditional machine learning classifiers like k-Nearest Neighbors, Support Vector Machines, and decision trees. Although these methods were moderately successful, they were highly sensitive to changes in lighting, background, and image quality.

Recent advances in deep learning, particularly in convolutional neural networks, have significantly improved the efficiency of plant classification problems. Transfer learning using pre-trained CNN models has also improved the accuracy of plant classification problems. On the other hand, conversational AI solutions have been widely accepted in healthcare applications for education, support, and information sharing. However, the development of a comprehensive system that combines deep learning-based plant identification and interactive Ayurvedic knowledge support is still in its infancy.

6. PROPOSED SYSTEM

The proposed system is designed to be an integrated intelligent platform with two major components: a medicinal plant identification module and an Ayurvedic knowledge assistance module. The identification module uses a convolutional neural network trained on a dataset of images of medicinal plants to identify plant species based on visual features. The knowledge assistance module is a conversational chatbot that interacts with users to provide information and details about medicinal plants..

7. SYSTEM ARCHITECTURE

The architecture of the system follows a modular and layered approach. The users interact with the system through a web interface, either by uploading images of plants or by asking questions. The uploaded images are preprocessed, and then the preprocessed images are fed to the trained CNN model for classification. Once the plant is identified, relevant information is fetched from a knowledge base and provided to the user through the conversational interface.

8. METHODOLOGY

The methodology used in this research work includes the gathering of datasets from publicly available sources of images of medicinal plants, followed by data preprocessing and augmentation to improve the generalization capability of the model. Transfer learning methods are used to take advantage of pre-trained deep learning models, thus allowing for effective training of the model even with a small amount of data. The chatbot part of the project is developed using natural language processing methods.

9. IOT ECOSYSTEM INTEGRATION

The proposed system can be expanded into a full-fledged Internet of Things environment by incorporating smart imaging devices, environmental sensors, edge computing nodes, and cloud analytics platforms. The Internet of Things device can be used to capture real-time images of plants as well as environmental factors such as temperature, humidity, and soil moisture levels. These values can be sent to cloud servers where AI algorithms can analyze the data and provide insights. The addition of IoT capabilities improves scalability and helps with plant conservation..

10. APPLICATIONS

The system has wide applications in Ayurvedic education and training, the administration of herbal gardens and nurseries, health awareness programs, research, and the conservation of rare and endangered medicinal plant species. The system can also serve as a supplementary learning tool for students and researchers.

11. ADVANTAGES

The proposed system offers accurate and automated plant identification, interactive and user-friendly knowledge access, scalability through cloud deployment, and effective preservation of traditional Ayurvedic knowledge using modern technology.

12. LIMITATIONS

The performance of the system depends on the quality of images, diversity of the dataset, and connectivity of the network. The system is only for educational and information purposes and is not a substitute for professional medical advice..

13. FUTURE SCOPE

Future upgrades may include the development of a mobile app, the use of regional languages through multilingual functionality, the implementation of augmented reality for real-time plant identification, the extension of the medicinal plant database, and collaboration with recognized Ayurvedic centers to develop authentic knowledge sources.

14. CONCLUSION

In this paper, an intelligent system is proposed that combines deep learning and conversational AI to transform the identification and dissemination of knowledge related to Ayurvedic medicinal plants. The proposed system combines image classification with interactive support, which improves the accessibility and awareness of traditional medicine. The proposed system has immense potential for practical implementation.

REFERENCES

[1] A. Gopal, S. P. Reddy, and V. Gayatri, "Classification of Selected Medicinal Plants Leaf Using Image Processing," in Proceedings of the 2021 International Conference on Machine Vision and Image Processing (MVIP), 2021.

[2] U. Habiba, M. R. Howlader, M. A. Islam, R. H. Faisal, and M. M. Rahman, "Automatic Medicinal Plants

Classification Using Multi-channel Modified Local Gradient Pattern with SVM Classifier," in Proceedings of the Joint 2019 8th International Conference on Informatics, Electronics & Vision (ICIEV) and 3rd International Conference on Imaging, Vision & Pattern Recognition (IVPR), 2019.

[3] R. Janani and A. Gopal, "Identification of Selected Medicinal Plant Leaves Using Image Features and Artificial Neural Network," in Proceedings of the 2019 International Conference on Advanced Electronic Systems (ICAES), 2019.

[4] T. Vijayashree and A. Gopal, "Leaf Identification for the Extraction of Medicinal Qualities Using Image Processing Algorithm," in Proceedings of the 2020 International Conference on Intelligent Computing and Control (I2C2), 2020.

[5] D. Venkataraman and N. Mangayarkarasi, "Support Vector Machine Based Classification of Medicinal Plants Using Leaf Features," in Proceedings of the 2017 International Conference on Advances in Computing, Communications and Informatics (ICACCI), 2017.

[6] S. Prasad and P. P. Singh, "Medicinal Plant Leaf Information Extraction Using Features," in Proceedings of the IEEE Region 10 Conference (TENCON), Malaysia, Nov. 5–8, 2017.

[7] M. R. Dileep and P. N. Pournami, "AyurLeaf: A Deep Learning Approach for Classification of Medicinal Plants," in Proceedings of the 2019 IEEE Region 10 Conference (TENCON), 2019.

[8] C. Amudha Lingeswaran, M. Sivakumar, and P. Renuga, "Identification of Medicinal Plants and Their Usage Using Deep Learning," in Proceedings of the Third International Conference on Trends in Electronics and Informatics (ICOEI), 2019, ISBN: 978-1-5386-9439-8.

[9] P. Manojkumar, C. M. Surya, and P. Gopi Varun, "Identification of Ayurvedic Medicinal Plants by Image Processing of Leaf Samples," in Proceedings of the 2018 Third International Conference on Research in Computational Intelligence and Communication Networks (ICRCICN), 2018.

[10] A. Sabu, K. Sreekumar, and R. R. Nair, "Recognition of Ayurvedic Medicinal Plants from Leaves: A Computer Vision Approach," in Proceedings of the 2019 Fourth International Conference on Image Information Processing (ICIIP), 2019.