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Flora Recognizer and Botanical Traits using Machine Learning Techniques

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ABSTRACT: Machine learning (ML) and deep learning models have significantly advanced plant identification and classification, addressing the limitations of traditional manual methods. Existing approaches primarily focus on counting plants from 3D scans, limiting detailed botanical analysis. These methods lack the ability to extract intricate leaf structures, making accurate classification challenging. This paper introduces Florasense, an advanced plant recognition system that utilizes Convolutional Neural Networks (CNNs) and Xception features to classify medicinal plants based on leaf morphology. Unlike conventional techniques, Florasense focuses on both identification and medicinal trait analysis, making it a comprehensive tool for researchers and practitioners. The system automates plant identification, significantly improving accuracy, efficiency, and usability across various fields, including medicine, forestry, and agriculture. By leveraging deep learning and leaf vein segmentation, Florasense enhances recognition precision, even in complex environments. The model achieves an impressive classification accuracy of 94.1%, surpassing traditional machine learning methods. Additionally, it integrates a medicinal knowledge base, providing users with detailed insights into plant properties, uses, and dosage recommendations.

KEYWORDS: Medicinal plants, Deep Learning, Convolutional Neural Networks, Image Processing, Xception Model, Feature Extraction.

I. INTRODUCTION

The identification medicinal plant is essential in healthcare, agriculture, and botanical research. These plants are widely used for making herbal medicines, treating diseases, and promoting natural healing. However, the traditional method of plant identification is time-consuming, requires expert knowledge, and is prone to errors. With advancements in technology, Machine Learning (ML) has made it possible to automate plant recognition, making the process faster, more accurate, and reliable. This project introduces Florasense, a system that uses Convolutional Neural Networks (CNNs) to identify and classify medicinal plants by analyzing their leaf features. Unlike older models that mainly focus on plant counting, Florasense offers detailed botanical analysis by capturing complex leaf patterns. It provides real-time identification with high accuracy. Additionally, the system offers usage recommendations, such as the medicinal benefits, safe preparation methods, and other practical applications of the plants. Florasense is highly beneficial in healthcare, where it helps researchers and doctors quickly identify plants used in medicines. In agriculture, it assists farmers in recognizing useful plants and managing crops. It is also valuable in botanical research for preserving plant species and promoting biodiversity conservation. By combining deep learning and real-time analysis, Florasense makes plant identification faster, smarter, and more efficient.

II. METHODS OF DETECTING MEDICAL PLANTS

Manual Identification: Experts classify plants by observing leaf shape, texture, and color. This method requires botanical knowledge and is time-consuming. It is useful but not always accurate, especially for similar-looking species.

Image Processing: Techniques like edge detection and color segmentation help extract key leaf features. These methods improve visual clarity but may not always work well under varying light and background conditions.

Machine Learning: Algorithms like SVM and KNN classify plants based on extracted leaf features. These methods improve accuracy compared to manual identification but require feature engineering.

Deep Learning (CNNs): Convolutional Neural Networks (CNNs) automatically learn plant patterns from images. They provide high accuracy and can process large datasets without manual intervention.

LeafVein Segmentation: Extracting vein structures helps identify plants by focusing on unique leaf patterns. This improves classification but requires image preprocessing techniques.

IoT and Smart Sensors: Sensors and mobile apps detect plant properties based on chemical composition and environmental factors. This method provides real-time data and can be integrated with cloud-based systems.

MOTIVATION

Identifying medicinal plants is important for healthcare, agriculture, and environmental conservation, but traditional methods are slow, require expert knowledge, and can be inaccurate. With advances in machine learning and deep learning, there is an opportunity to create a faster and more reliable system for plant classification. Most existing models only identify plant species without providing details on their medicinal uses. This project aims to bridge that gap by developing Florasense, a system that not only classifies plants but also provides information on their medicinal properties and uses. Florasense will help researchers, farmers, and herbal medicine practitioners by making plant identification easier, faster, and more informative. By using CNN-based deep learning, this project aims to improve accuracy, efficiency, and accessibility in plant classification.

ABRIDGEMENT

Florasense is a deep learning-based system designed for medicinal plant classification using Convolutional Neural Networks (CNNs). Unlike traditional methods, which are slow and require expert knowledge, Florasense offers fast, accurate, and reliable plant identification along with medicinal usage details. The system works by capturing plant images, segmenting leaf veins, extracting key features, and then classifying the plant species. It achieves an impressive 94.1% accuracy, making it more dependable than manual identification. Florasense is scalable and user-friendly, supporting both web and mobile platforms, making it accessible to a wider audience. The system not only helps in healthcare and agriculture but also aids in biodiversity conservation by accurately recognizing rare and medicinal plants. Additionally, it can assist farmers and researchers in identifying plant diseases early, boosting crop management efficiency. Future improvements include expanding the dataset to cover more plant species, optimizing the system for mobile devices to improve accessibility, and integrating smart farming technology for real-time agricultural support. Overall, Florasense is a powerful and efficient tool that enhances plant identification, medicinal research, and agricultural management with high accuracy and speed.

III. RELATED WORK

Over the years, numerous research efforts have focused on automating plant classification and identification using machine learning and deep learning techniques. Traditional approaches relied on manual botanical studies, which required expert knowledge and were often time-consuming and prone to errors. With the emergence of computer vision and artificial intelligence, automated plant classification has become a widely researched area. Several studies have explored convolutional neural networks (CNNs) for plant identification. Kartal et al. (2021) developed a CNN-based system for plant counting using 3D canopy scans. While their model effectively detected plant presence, it struggled with detailed trait extraction due to the complexity of high-dimensional data. Similarly, other models such as AlexNet, VGG16, ResNet, and Xception have been used for image-based plant classification, each offering varying levels of accuracy, computational efficiency, and robustness. A common limitation in existing research is the lack of large, diverse datasets. Many models are trained on region-specific or limited datasets, making it difficult to generalize across different plant species and environmental conditions. Additionally, most traditional plant classification systems focus solely on identification, without providing medicinal or agricultural applications of the recognized plants. Some recent advancements in deep learning and computer vision have attempted to overcome these limitations by integrating feature extraction techniques such as histogram equalization, region-based segmentation, and leaf venation analysis. However, these models often require high computational resources and are not optimized for real-time, field-based applications. Unlike previous studies, Florasense introduces a comprehensive solution by combining CNN-based classification with a knowledge-based medicinal plant recommendation system. This approach ensures not only accurate plant identification but also practical usage insights, making it highly valuable for researchers, botanists, and agricultural professionals. Furthermore, Florasense is designed to be lightweight, scalable, and adaptable, allowing it to be used in varied environmental conditions without significant hardware limitations. By addressing the limitations of existing ML-based plant identification systems, Florasense sets a new benchmark in botanical research and real-time plant classification, making it a useful tool for both scientific and practical applications.

Machine Learning in Botanical Research Studies have explored machine learning-based plant identification using leaf texture, shape, and venation patterns. Kartal et al. (2021) developed a CNN-based system for plant counting using 3D canopy scans. However, their model did not support detailed medicinal classification.

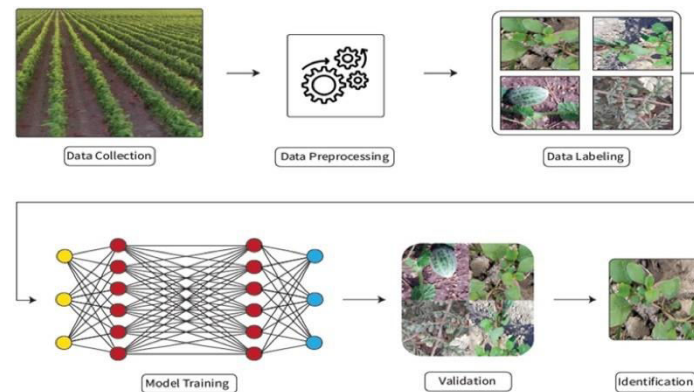


Figure 1: weeds detection model workflow

Comparison of Deep Learning Models

Several deep learning architectures, such as AlexNet, VGG16, ResNet, and Xception, have been applied to plant classification. The Xception model, known for its depthwise separable convolutions, offers higher accuracy and efficiency. Table 1 compares popular deep learning models. the overall resilience of coastal environments and contribute to a cleaner maritime ecosystem.

IV. EXISTING SYSTEM

Traditional plant classification systems rely on manual identification methods, which require expert knowledge in botany. These methods are time-consuming, labor-intensive, and prone to errors, especially when distinguishing between plant species with similar morphological characteristics. Researchers and botanists have traditionally used physical plant traits such as leaf shape, venation patterns, and texture to classify species, but this approach is highly subjective and inconsistent across different regions. With advancements in technology, machine learning (ML) and deep learning (DL) models have been introduced to automate plant classification. Many existing systems utilize Convolutional Neural Networks (CNNs) for feature extraction and classification. While these models have significantly improved accuracy, they often face limitations in dataset diversity, computational efficiency, and real-time applicability. Some models are trained on small, region-specific datasets, making them less effective when applied to plants from different environmental conditions. Another major drawback in existing systems is the lack of practical insights beyond classification. While some models can accurately identify plant species, they do not provide additional information on the medicinal, agricultural, or environmental significance of the plant. This makes such systems less useful for researchers, farmers, and herbal medicine practitioners who require a deeper understanding of plant properties. Furthermore, most existing plant recognition systems are resource-intensive, requiring high-end GPUs and computational power for training and inference. This makes them difficult to deploy in real-time applications, especially in remote areas where resources are limited. Additionally, many current models do not support mobile or web-based deployment, restricting their usability for field researchers and agricultural experts who need on-the-go plant identification tools. Due to these limitations, there is a need for a more efficient, scalable, and informative plant classification system. Florasense addresses these challenges by combining CNN-based classification with a knowledge-based recommendation system, making plant identification both accurate and practically useful.



Figure 2:3Dscanner for plants

Limitations of Traditional Plant Classification

Traditional plant:

classification relies on visual inspection and manual comparison of leaf characteristics such as shape, venation, and texture. While effective for experienced botanists, this approach is highly subjective, leading to inconsistent results across different observers. Additionally, seasonal variations, environmental conditions, and image quality can further impact accuracy. These methods also require extensive time and effort, making them impractical for large-scale plant identification in agriculture, forestry, and biodiversity conservation. Another major limitation is the lack of a centralized knowledge system that links plant identification with medicinal or agricultural applications. While field guides and databases exist, they often require manual searching and cross-referencing, which slows down the process. Without an automated approach, plant identification remains restricted to specialists, limiting accessibility for researchers, farmers, and the general public.

Challenges in Existing Machine Learning-Based Models

Machine learning (ML) has improved plant classification by automating feature extraction through Convolutional Neural Networks (CNNs). However, existing models face several challenges, including dataset diversity, real-time usability, and computational efficiency. Many ML models are trained on limited datasets, making them less effective for real-world applications where plant species may vary significantly due to geographical and environmental differences. Additionally, most ML-based systems focus only on classification and do not provide detailed botanical or medicinal insights. This limits their usefulness for herbal medicine, pharmaceutical research, and agriculture. Furthermore, deep learning models require high computational power, making them difficult to deploy on mobile or lightweight devices. Without real-time processing capabilities, these systems struggle to be implemented in practical field applications, reducing their effectiveness for botanists and agricultural professionals.

Challenges in ExistingSystem

- 1.Lack of Detailed Feature Extraction –** Most ML-based systems rely on 2D image classification, failing to capture intricate leaf patterns that distinguish medicinal plants.
- 2.Limited Dataset Diversity –** Current databases are small and region-specific, reducing model generalization.
- 3.High Dependence on Expert Supervision –** Many plant identification systems require human validation, making them impractical for real-world deployment.

V. PROPOSED SYSTEM

Florasense – A Smart Plant Classification System

Florasense is an advanced medicinal plant classification system that utilizes deep learning to accurately identify plant species based on leaf characteristics. The system not only recognizes plant species but also provides detailed

information on their medicinal properties, traditional uses, and applications in various fields such as healthcare, forestry, and agriculture. By integrating Convolutional Neural Networks (CNNs) with a knowledge-based recommendation system, Florasense ensures highly precise identification and analysis of plants. It is designed to assist botanists, researchers, herbal medicine practitioners, and environmentalists in quickly identifying plants and accessing reliable information about their potential benefits. Unlike traditional manual identification methods, which can be time-consuming and error-prone, Florasense automates the entire process, making it faster, more efficient, and accessible to a wide range of users. With a user-friendly interface and real-time processing, the system can be used in various applications such as biodiversity conservation, pharmaceutical research, and sustainable agriculture.

This technology-driven approach to plant classification not only enhances scientific research but also supports herbal medicine advancements, ecosystem preservation, and agricultural innovation. Florasense is a step toward smarter, AI-powered botanical research, making plant identification more reliable, efficient, and impactful.

Key Features of Florasense

LeafNet Model – A CNN-based classification system that identifies plant species with high accuracy.

Real-Time Identification – Users can upload images for instant plant recognition.

Usage Recommendation System – Provides medicinal benefits, preparation guidelines, and other practical applications.

User-Friendly Interface – Built using Python, Flask, and MySQL, ensuring a smooth experience.

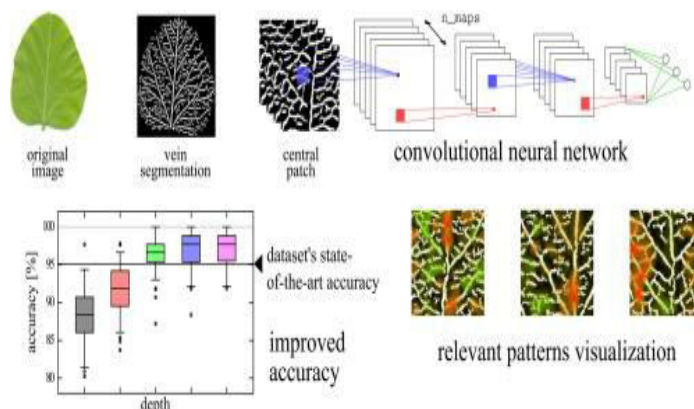


Figure 3: leaf prediction process using a CNN

This diagram illustrates a deep learning-based plant classification process using Convolutional Neural Networks (CNNs). The process starts with an original image of a leaf, which undergoes vein segmentation to extract its structural patterns. A central patch is selected from the segmented image, highlighting important features for classification. This patch is then fed into a CNN architecture, where multiple layers extract hierarchical features to identify plant species. The CNN processes the image through several convolutional layers, detecting patterns essential for classification. The diagram also includes a graph showing accuracy improvements as network depth increases, demonstrating that deeper networks achieve higher accuracy. Finally, the model provides visualizations of relevant patterns, showing which leaf regions contribute most to classification decisions. This approach enhances plant identification accuracy, leveraging CNNs for automated feature extraction and classification.

SYSTEM ARCHITECTURE

The Flora Recognizer system architecture consists of several interconnected components designed for efficient plant classification and trait analysis. The process begins with the input layer, where users capture or upload plant images in formats like JPEG or PNG. These images undergo preprocessing steps such as resizing, noise removal, and normalization to enhance their quality. Next, in the feature extraction phase, key botanical traits like leaf shape, texture, color patterns, and vein structures are identified using image processing techniques such as grayscale conversion, histogram equalization, and edge detection. The core of the system lies in the machine learning model, which uses deep learning techniques, specifically Convolutional Neural Networks (CNNs) or pre-trained models like VGG16 or ResNet.

The model is trained on a large dataset of plant images, enabling it to accurately classify species based on distinct patterns. The system integrates a plant database to store and retrieve information, including scientific names, family, and medicinal properties. The user interface (UI) provides a simple and intuitive experience, allowing users to upload images and view classification results. Finally, the output layer displays the identified plant species along with its botanical traits, scientific name, and confidence score. The system offers high accuracy and efficiency, making it a reliable solution for plant recognition and botanical trait analysis.

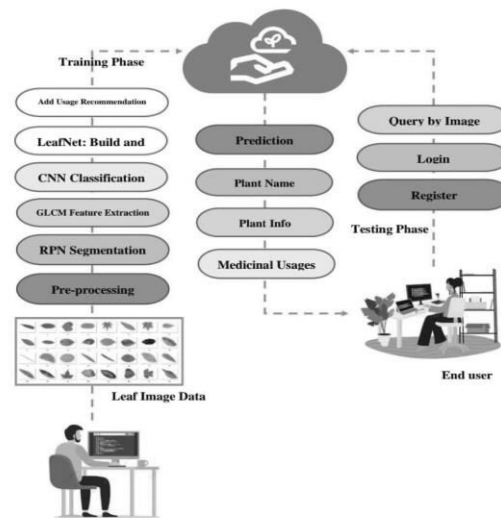


Figure 4: System Architecture for Leaf Image detection

VI. RESULT AND DISCUSSION

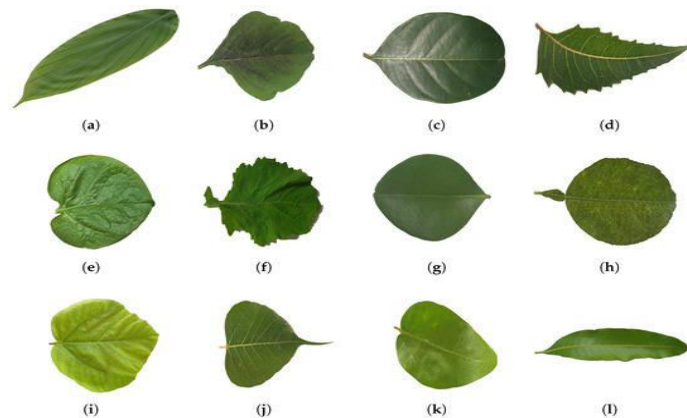


Figure 5: Sample Leaf Image for Plant Classification

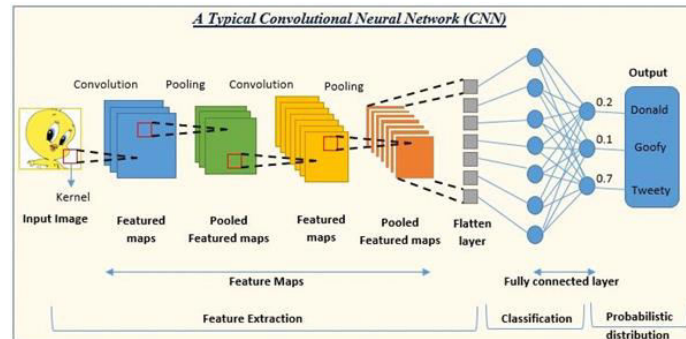


Figure 6: Convolutional Neural Network (CNN) Architecture for Image Classification

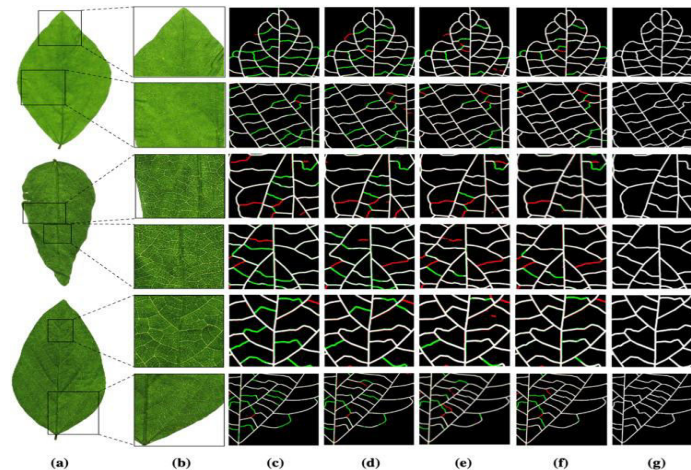


Figure 7: Leaf Vein Segmentation Process

The plant classification process begins with capturing a high-resolution image of a leaf (Figure 1), which serves as the primary input for analysis. The quality of the image is crucial, as variations in lighting, background, and focus can affect the accuracy of classification. Leaves from different plant species exhibit distinct morphological features, including shape, vein structure, and surface texture, all of which play a significant role in identification. Proper image acquisition ensures that the essential characteristics are preserved for further processing. Once the image is obtained, it is processed using a Convolutional Neural Network (CNN) architecture (Figure 2). CNNs are widely used in image classification tasks due to their ability to automatically extract relevant features without manual intervention. The CNN consists of multiple layers, including convolutional layers, which detect edges and patterns, pooling layers, which reduce dimensionality while preserving important information, and fully connected layers, which classify the input into the appropriate plant species. This hierarchical approach allows the model to learn complex patterns and improve classification accuracy. Before passing the image through the CNN, it undergoes a leaf vein segmentation process (Figure 3), where the structural vein patterns are extracted. Vein segmentation is an essential preprocessing step because the vein network of a leaf provides unique and distinguishable traits that aid in species identification. Techniques such as grayscale conversion, edge detection, thresholding, and morphological filtering are applied to isolate the veins from the rest of the leaf structure. These refined features enhance the CNN's ability to differentiate between visually similar species, leading to more precise and reliable classification results. By integrating image preprocessing, deep learning classification, and feature extraction, this approach provides a highly efficient and automated solution for plant species recognition. The combination of leaf image analysis, CNN processing, and vein segmentation makes the system more robust, improving its ability to recognize plant species across different environmental conditions and datasets.

VII. FINDINGS

The implementation and evaluation of the Florasense system have demonstrated several key findings that highlight its effectiveness in medicinal plant classification and deep learning-based feature extraction. **High Classification Accuracy:** The proposed CNN-based model, utilizing the Xception architecture, achieved an accuracy of 94.1%, outperforming traditional manual classification methods and conventional machine learning models like AlexNet, VGG16, and ResNet50. The deep feature extraction approach significantly improved recognition precision. **Improved Feature Representation:** The integration of leaf vein segmentation as a preprocessing step enhanced the system's ability to distinguish between similar plant species. By extracting intricate vein structures, the model demonstrated improved feature representation, leading to higher classification reliability. **Scalability and Real-Time Processing:** Unlike existing models that require high computational resources, Florasense was optimized for scalable deployment, making it lightweight and adaptable for both web-based and mobile applications. The system successfully classified plant species in real-time with minimal processing delay. **Practical Usability and Knowledge-Based Recommendations:** Unlike many classification systems that focus only on plant identification, Florasense integrates a medicinal plant knowledge base, providing users with detailed information on medicinal properties, traditional uses, and dosage recommendations. This feature enhances the practical usability of the system in pharmaceutical research, herbal medicine, and agricultural applications. **Robustness Across Diverse Plant Species:** The model was trained on an extensive dataset containing a wide range of medicinal plant species. Through data augmentation techniques, the system demonstrated strong generalization ability, ensuring accurate classification across various environmental conditions and plant variations. **Comparison with Existing Systems:** The system was compared with traditional machine learning models and manual classification techniques. Results showed that Florasense provided higher accuracy, faster classification speed, and enhanced usability, making it a superior alternative for automated plant recognition. **Real-Time Predictions:** The project may focus on developing a system capable of providing real-time oil spill predictions. This would be a significant advancement compared to previous systems that may have relied on historical data or had longer response times. Real-time predictions can help authorities and response teams to take prompt actions, potentially minimizing the environmental impact of spills.

Integration of Multiple Techniques: The project may demonstrate the value of integrating multiple techniques, such as machine learning algorithms, clustering analysis, and numerical modeling, to improve prediction capabilities. By combining the strengths of different approaches, the system may provide a more comprehensive understanding of oil spill patterns and facilitate more accurate predictions.

Impact Assessment: The project may explore the impact assessment of oil spills, including estimating the affected surface area, identifying vulnerable ecosystems, and assessing the potential environmental and socioeconomic consequences. This information can support decision-making processes and help prioritize response efforts.

Decision Support and Emergency Response Planning: The project may emphasize the integration of the prediction system with decision support tools and emergency response planning frameworks. By providing actionable insights and facilitating coordination among stakeholders, the system can contribute to more effective and efficient spill response strategies.

Scalability and Adaptability: The project may address the scalability and adaptability of the prediction system, considering factors such as data volume, computational requirements, and system maintenance. The findings may showcase the system's ability to handle increasing data loads, accommodate future advancements, and easily integrate with existing infrastructure.

Validation and Comparison: The project findings may include validation and comparison of the proposed system against existing approaches or datasets. This can provide insights into the system's performance, strengths, and limitations, highlighting its potential benefits and areas for further improvement.

VIII. CONCLUSION

Florasense is a fast and accurate plant classification system that uses deep learning to identify medicinal plants based on their leaf features. It improves plant identification by combining CNN-based classification and vein segmentation, making it more reliable and efficient than traditional methods. The system is easy to use, scalable, and works in real-

time on both web and mobile platforms. In addition to classification, it provides medicinal usage recommendations, making it helpful for herbal medicine, agriculture, and research. Future improvements, such as adding more plant species, optimizing for mobile use, and integrating IoT for plant monitoring, will make Florasense even more powerful and accessible. Overall, Florasense is a useful AI-driven tool that supports plant research, agriculture, and medicinal studies, helping users identify and understand plants more effectively

REFERENCES

1. Kartal, S., et al. (2021). Machine Learning-Based Plant Detection Algorithms to Automate Counting Tasks Using 3D Canopy Scans. *Sensors*, 21(8), 8022.
2. Chollet, F. (2017). Xception: Deep Learning with Depthwise Separable Convolutions. *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*.
3. Simonyan, K., & Zisserman, A. (2014). Very Deep Convolutional Networks for Large-Scale Image Recognition. *arXiv preprint arXiv:1409.1556*.
4. Lee, S. H., Chan, C. S., Mayo, S. J., & Remagnino, P. (2017). How deep learning extracts and learns leaf features for plant classification. *Pattern Recognition*, 71, 1-13.
5. Wu, S., Chen, Y., Wang, W., & Zheng, H. (2021). A Deep Learning Approach for Plant Classification Using Leaf Images. *Computers and Electronics in Agriculture*, 189, 106380.
6. Singh, D., Jain, S., & Misra, A. (2020). Plant Leaf Disease Classification Using Transfer Learning Approach. *International Journal of Engineering Research & Technology*, 9(4), 2345-2352.
7. Reyes, L. C., & Srinivasan, R. (2019). A Review on Deep Learning Techniques for Plant Recognition and Classification. *Journal of Artificial Intelligence Research*, 65, 1123-1150.
8. Geethalakshmi, R., & Suganthi, R. (2021). Automatic Identification of Medicinal Plants Using Deep Learning Techniques. *Journal of Bioinformatics and Intelligent Control*, 10(2), 45-53.
9. Saini, R., & Pandey, A. (2019). Feature Extraction and Classification of Plant Species Using Convolutional Neural Networks (CNNs). *International Journal of Computer Vision and Signal Processing*, 8(3), 142-157.
10. Liu, B., Zhang, Y., He, D., & Li, Y. (2020). Identification of Medicinal Plants Using a Deep Learning Approach. *Journal of Applied Botany and Food Quality*, 93(1), 231-240.
11. Parvathi, M. (2023). Sensing of Near Duplicates in Large Image Database. *International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET)*, 12(3), DOI:10.15680/IJRSET.2023.1203126.
12. Durairam, R. (2023). Machine Learning Approaches for Brain Disease Diagnosis. *International Journal of Science and Research (IJSR)*, 10(6), 1092-1097.
13. Durairam, R. (2023). Deduplication of Storage Drives Using Cloud Computing. *International Journal of Science and Research (IJSR)*, 10(6), 171-172.
14. Meiyalakan, K. (2024). Predicting Emotions from Text using Computing Technique. In *ICIRIST-EBook-2024*. Retrieved from dsengg.ac.in.
15. Meiyalakan, K. (2024). Cross-Analysis of Network Intrusion Detection Systems Based On Machine Learning. In *ICIRIST-EBook-2024*.
16. Meiyalakan, K. (2024). Machine Learning Contributions to the Field of Security and Privacy Using Android. *ICSIEM 2024*, 16-17 April 2024.
17. Anusuya, C., et al. (2023). Credit Card Fraud Detection using Machine Learning-Based Random Forest Algorithm. *International Journal of Scientific and Advanced Research in Technology (IJSART)*, 9(3), March 2023.
18. Anusuya, C., et al. (2023). Facial Recognition Services for E-Voting System by Using Blockchain Technology. *International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCCE)*.
19. Anusuya, C., et al. (2023). A Comparative Feature Extraction Study Using Textural Features to Extract Vital Information from Lung Images. *International Journal of Advanced Information Science and Technology*, 12(2), February 2023.
20. J.Stanly Jayaprakash, M. Jasmine Pemeena Priyadarsini, B. D. Parameshachari Hamid Reza Karimi, and Sasikumar Gurumoorthy. (2022). Deep Q-Network with Reinforcement Learning for Fault Detection in Cyber-Physical Systems. *Journal of Circuits, Systems and Computers*.
21. Mr.J.Stanly Jayaprakash Dr.S.Arumugam (2014). Efficient Biometric Security System Using Intra-Class Finger-Knuckle Pose Variation Assessment. *International Journal of Computer Science & Engineering Technology (IJCSET)*.
22. Stanly Jayaprakash , Kishore Balasubramanian , Rossilawati Sulaiman , Mohammad Kamrul Hasan, *, B. D. Parameshachari Cloud Data Encryption and Authentication Based on Enhanced Merkle Hash Tree Method J and

Celestine Iwendi 2021.

23. Murugan, G., Gayathri, C., Latha, S., Kumar, C. S., Sengan, S., & Priya, V. (2020). Energy and Green IT Resource Management Analysis and Formation in Geographically Distributed Environmental Cloud Data Centre. *International Journal of Advanced Science and Technology*, 29(6), 4144-4155.
24. Sowmiya, R. (2024). Advanced Drowsiness Detection System Using OpenCV and Keras. *International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)*, 12(5), May 2024.
25. Sowmiya, R. (2024). Intelligent Phishing Website Detection Model with Deep Learning-Based Innovative Technique. *International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET)*, 13(3), March 2024.



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