Available online @ https://jjem.jnnce.ac.in
https: www.doi.org/10.37314/JJEM.SP0254
Indexed in International Scientific Indiexing (ISI)
Impact factor: 1.395 for 2021-22
Published on: 08 December 2024

Real-Time Determination of Medicative Herbs

Nandana U R[1] & ArunKumar K L[2]

Department of Computer Application,Assistant Professor of Computer Application

JNN College of Engineering, Shimogga

nandana2615@gmail.com, arunkumarkl@jnnce.ac.in

Abstract

In India, from the earliest time, plants have been used as a source of medication. but in the current generation where everything is fast and the growth of technology taking root the knowledge and gratitude for remedial plants are slowly diminishing. many aren't even aware of those plants that are native to their local environments and their medicinal value. differentiating between plants used in medicine is an extremely demanding procedure that needs time and knowledge. using machine learning and mainly image processing the image-based search engine presented in this paper identifies the plants based on the plant morphological characteristics such as shape color and texture these attributes are then applied to estimate the variety of medicinal plants and provide data relating to their cure rate with great reliability, the dataset that was employed in the present research has been taken from kaggle and this model is capable of estimating medicinal leaves with a precision level of up to 98%.

Keywords:*Machine learning, Morphological characters, Image Processing.*

1. Introduction

Ayurveda is an ancient system of medicine practiced in India and has its roots in the Vedic times. The ancient treasure has around 400000 medicinal plants but only 270000 plants were identified by botanists and ayurvedic practitioners. The rest of the Medicinal plants are unidentified and it is challenging to identify them manually due to the similar morphological structure of plants. The manual identification is prone to error. Plants are vital to all life on Earth, including human life. Plants have been utilized by humans for generations in healthcare systems to provide natural remedies for a variety of diseases. And plants have a major impact on how the natural cycle works. Plants are incredibly useful since they are the foundation of the food chain and are the origin of numerous treatments. Despite numerous imaginative advancements made in the field of botany, there are still a huge number of unexplored, unidentified, and unutilized plants. Also, in recent times many people in the world are unaware of the immersive benefits these plants offer and are unable to identify them. and this knowledge gap shows how crucial it is to inform people about the value and identification of medicinal herbs appropriately and clearly. Many researchers and academicians developed an automatic plant identification and categorization system. Researchers have used imageprocessing techniques to develop a plant disease detection system. The detection is done using the plant's morphological and geometrical features such as leaves flowers, stems, and roots. Most of the researchers used leaf features due to their availability in all seasons. Computerassisted plant identification has developed into a fascinating area of study to obtain data. The desire for automated technologies that would enable non-botanical people to carry out important fieldwork of identifying and characterizing plants, has increased because of the global shortage of

specialist taxonomists. These instruments are necessary in many fields, such as forestry, agronomy, and pharmaceutical science. Plant Using a leaf picture for diagnosis is the most successful and reliable method when compared to the alternative method. Because inexpensive digital cameras are readily available, taking samples of leaves and taking pictures of them is practical and viable. The application of machine learning, which is currently very well-liked and in use, has been made in several industries, including biology, medicine, computer vision, speech recognition, and others.When contrasted with conventional machine learning approaches, machine learning can extract more precise information.

2.Literature Survey

Kavith. S et al. in [14], proposed a deep learning model for medicinal plant identification. In this study, photos of leaves were gathered, enhanced, and the model was trained over a period of fifteen epochs. During testing, the findings revealed great recall, accuracy, and precision rates (all over 97%). After that, the model wasput into use on Google Cloud Platform (GCP) and incorporated into a mobile application for real-time plant identification, exhibiting efficient operation and usefulness. Jayalath et al. in [8], describes approaches regarding the determination of herbs through computerization of the morphological characters these include the basic aspects of the plants like the their color and the texture of the leaves the flowers too. Are taken into account this approach helps to increase the correctness of identification of medicinal plants which is critical in traditional medicine. Upendra Rao et al. in [17], addresses the strategy of applying deep learning methods to classify medicative herbs from pictures of their leaves. The methodology involves acquiring pictures of plant leaves and pre-processing these pictures as well as developing a CNN for plant identification through a mobile interface the study reports accuracy up to 98.33% which indicates successful use of this methodology in real life. Owais. A et al. in [12], in this work the determination of beneficial herbs they utilized efficient deep learning networks and investigated a mobile application for user engagement. A dynamic database for storing plant photos and computer vision for training and validation were all built as part of the project in terms of accuracy the model performed 87% top-1 on private datasets and 84% on public datasets. Accuracy was 78.5% top-1 and 82% top-5 in real-time testing using the smartphone app. The study emphasizes the potential for real-time botanical recognition to support preservation efforts for healing plants and biodiversity management. A.Gopal et al. in [1], suggested algorithm is put into practice and the effectiveness of the system is established by testing it on ten distinct plant species the software is trained with 100 leaves and tested with 50 leaves. Developed a system using image preprocessing with pictures of the plant leaves the software returns the closest match to the query the suggested algorithm implementation efficiency is determined to be 92%. Habiba Umme et al. in [16], introduced a multichannel- modified local gradient pattern. A novel texture-based feature descriptor that leverages several color picture channels to extract more relevant features and enhance classification performance, in addition to automatically categorizing pharmaceuticals for medicinal use the recommended method was trained by the author using a system classifier with a variety of kernels including polynomial and linear additionally by carrying out the rigorous experiment on collection of herbal remedies they used several feature descriptors for comparative evaluation using mcmlgp. The suggested method outperforms previous methods in terms of accuracy 96% and is highly beneficial for the research and progress of therapeutic product categorization. R.Janani et al. in [13], have put out a technique to extract texture color and shape information from photos of leaves and train from the beginning, neural network models and classifiers have been exploited. The precise leaf class choosing the right picture input feature is crucial to achieving great efficiency

with minimal computing complexity they assessed the accuracy of the network using various input feature combinations according to the test results on 63 leaf photos this approach can achieve an accuracy of 94% when at least 8 input characteristics are used this method is more popular for leaf identification systems that need less computing time and little input. Vijayashree et al. in [18], assembled 127 herbal leaves into a database, when building a database eleven texture parameters are considered aspect ratio, correlation, mean sum average, sum of variance, inverse difference moment and sum entropy are the parameters entropy homogeneity contrast and energy are among the metrics, that may be found using the gray-level matrix of recurrence glam. A test image is captured and compared to the database and the retrieved parameters are used to determine the dissimilarity the leaf is determined to have the least amount of dissimilarity and the result is shown. D Venkataraman et al. in [7], an identification system for plants is devised together with information on their medicinal properties to aid in the natural treatment of various maladies. In this work the dataset collection texture and extraction of characteristics and subsequent support vector machines method categorization are covered. Shitala Prasad et al. in [15], the paper that outlines an innovative effective method for acquiring leaves the format color space occupied to calculate the vgg16 feature map once it has been transformed to a device-independent format the purpose of this feature map re-projection is to enhance the performance particularly for species recognition to the PCA subspace the research uses two types of plant leaf datasets to illustrate the effectiveness of the suggested approach .

3. Methodology

3.1. Image Processing Techniques: To increase the quality of the photograph or to reduce noise the optimizing footprints technique is applied. The image's footprint can be optimized by using methods like resizing, denoising, or filtering To enhance its analytical capability. and afterward, to reduce the image to a single channel (intensity) while maintaining crucial visual information, a greyscale conversion technique was added. This procedure is frequently used to focus on key features like edges and textures while reducing the computational complexity. and Edge detection approaches are used to identify and highlight boundaries or edges in an image. Techniques like the Commonly applied technologies include Canny edge detectors and Sobel operators. for this purpose. Edge detection helps in segmenting items in the picture and extracting important structural information.

3.2. Future Extraction: Tensorflow and keras libraries helps to extract texture properties from the picture dataset and also it help to preserve texture features across many frequencies in the picture capturing important visual aspects.

3.3. ResNet50 Model: the classification task involves several classes of medicinal herbs where we need to determine the probabilities for each class and because of the existence of a large variety of classes in differentiating the complex hierarchical structure, we use ResNet50.ResNet50 id a pretrained d-Deep Learning Model which is popularly used for image classification technique.

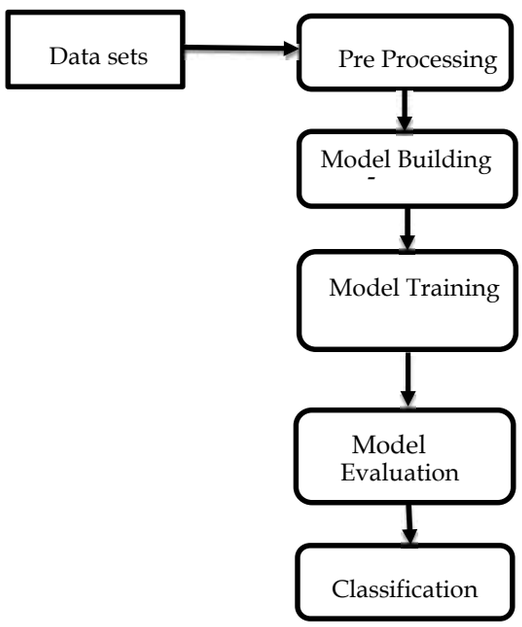

Figure 1: Flow Diagram

Data Preparation: For this research, we have gathered the data from the Kaggle website. For more accuracy, we have Collected high-quality images with clear visibility of plant features and minimal distortion or noise. Preferably, choosing images that are properly focused, and captured from multiple angles for identification of medicinal plants .

Figure 2: Dataset

Pre Processing: An input layer that receives grayscale or RGB pictures of medicinal plants is where the schematic design begins. Preprocessing is typically used for raw images in order to increase footprints grayscale.

Model Building:First we employ the resnet50 pre-trained model this model can identify a wide variety of attributes in photos. Since it was previously trained on a huge dataset of pictures called imagenet we construct additional layers on top of the resnet50 basis specifically tailored for our purpose of categorizing photos of seven distinct plant species we do this by removing the top portion of the resnet50 modelwhich is particular to the imagenet database.

Model Compilation: the project was complied utilizing Adams optimizer to update physical weight section loss and precision as a performance indicator. To make sure the model performs well when applied to fresh, untested data, its performance was assessed on the validation set.

Model Training: for a predetermined number of epochs the model was trained utilizing the training dataset in order for the model to accurately differenciate the photos during training, the validation set was used to assess the models performance to make sure it would translate effectively to newly discovered data and then the models accuracy and loss were assessed utilizing the validation set the trained model was then stored for subsequent use enabling us to load it and utilize it to predict new photos.

classification: Our training Restnet50 model can classify the new images from the pictures of the leave’s uploaded from the users.

4. Results and Discussion

from this model, we can achieve an accuracy of 98%. An accuracy of 98% shows that the model can identify the medicinal plants in pictures at an accuracy of approximately 98 times out of every 100 images. This great degree of precision suggests that the model is very good at differentiating between several plant species according to their visual features. It's like having a highly accurate expert who can recognize medicinal plants with great precision, making the model reliable for practical use in plant identification tasks.

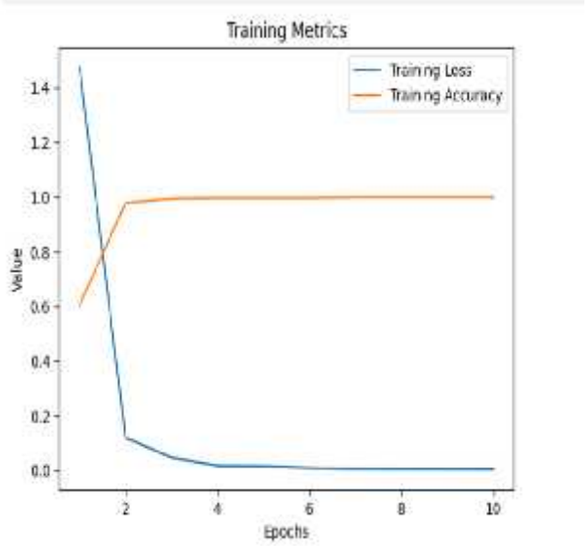

Figure 3: Accuracy Graph

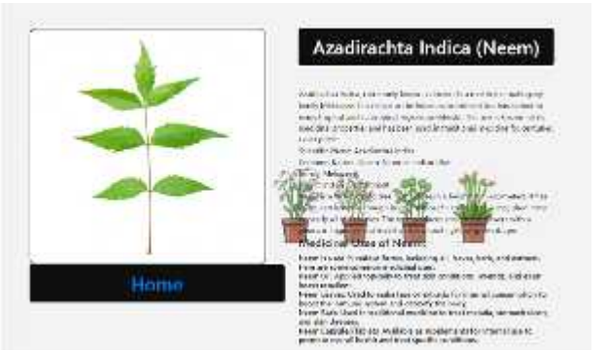

Figure 4: Model Snapshot

5. Conclusion

Reliability in a manual identification process mostly depends on human expertise. They frequently use their years of accumulated familiarity with a herb smell or test to identify it manually, identifying medicinal plants takes effort and is prone to human error, moreover many in today's world are ignorant of the enormous benefits of medicinal herbs so the recent advances in analytical technology have tremendously benefited in the process of automatically identifying herbs this is greatly appreciated by many, particularly by those who are fresh to the field of plant identification. Moreover, knowledge of sample collection and data interpretation is necessary for laboratory-based analysis which increases the laborious processes therefore having a fast and precise method for identifying herbs is necessary for selecting the appropriate species of medicinal plant in this work we have proposed an automatic system for identifying medicinal plants using CNN algorithm. An overall 98.3% accuracy precision is achieved by this model.

6. Reference

1. A.Gopal,"Classification of Selected Medicinal Plants Leaf Using Image Processing ” Published in InternationalConference on Machine Vision and Image Processing(MVIP), 2012.
2. Arunkumar K L, Ajit Danti ,"Recognition of Vehicle using geometrical features of a tail light in the night vision", ,National Conference on Computation Science and Soft Computing (NCCSSC-2018)
3. Arunkumar K L, Ajit Danti, “A Novel Approach for Vehicle Recognition Based on The Tail Lights Geometrical Features In The Night Vision”, International Journal of Computer Engineering and Applications, Volume XII, Issue I, Jan. 18, www.ijcea.com ISSN 2321-3469
4. Arunkumar K L, Ajit Danti, Manjunatha H T ,"Estimation of vehicle distance based on feature points using monocular vision", , IEEE 8816996 (2019), 1-5
5. Arunkumar K L, Ajit Danti, Manjunatha HT , D Rohith ,"Classification of Vehicle Type on Indian Road Scene Based on Deep Learning", Springer, Singapore 1380 (2021), 1-10
6. Aunkumar K L, Ajit Danti, Manjunatha H T, “Classification of Vehicle Make Based on Geometric Features and Appearance-Based Attributes Under Complex Background", Springer 1035 (CCIS), pp 41-48
7. D Venkataraman, Mangayarkarasi N "Support Vector Machine Based Classification of Medicinal Plants Using Leaf Features" InternationalConference on Advances in Computing, Communicationsand Informatics (ICACCI), 2017.
8. Jayalath, “Identification of Medicinal Plants by Visual Characteristics of Leaves

and Flowers” published in IEEE 14th International Conference on Industrial and Information Systems (ICIIS), 2019.

9. Manjunatha H T Arunkumar K L, Ajit Danti ,"A Novel Approach for Detection and Recognition of Traffic Signs for Automatic Driver Assistance System Under Cluttered Background" , Springer 1035 (CCIS), pp 407-419
10. Manjunatha H T, Ajit Danti, ArunKumar K L, D Rohith ,"Indian Road Lanes Detection Based on Regression and clustering using Video Processing Techniques", , Springer, Singapore 1380 (CCIS), 193-206
11. Nrupatunga, KL Arunkumar, Peruse and Recognition of Old Kannada Stone Inscription Characters, CM, Springer, Singapore, 2020
12. Owais A, “Automated Real-Time Identification of Medicinal Plants Species in Natural Environment Using Deep Learning Models”, published in PubMed Central in 2022.
13. R.Janani, A.Gopal "Identification of selected medicinal plant leaves using image feature and ANN" published in international conference on advanced electronic system, 2013.
14. S Kavitha, “Medicinal Plant Identification in Real-Time Using Deep Learning Model” Published in SN Computer Science volume 5 article number 73,2023.
15. Shitala Prasad, Pankaj P Singh"Medicinal Plant Leaf Information Extraction Using Deep Features" published in Proc. of the 2017 IEEE Region 10 Conference (TENCON), Malaysia, November 5-8, 2017
16. Umme Habiba, Md. Rasel Howlader, Md. Aminul Islam, Rahat Hossain Faisal and Md. MostafijurRahman"Automatic "Medicinal Plants Classification using Multichannel Modified Local Gradient Pattern with SVM Classifier" published in Joint 2019 8th International Conference on Informatics, Electronics & Vision (ICIEV) & 3rd International Conference on Imaging, Vision & Pattern Recognition (IVPR)
17. Upendar Rao M, “Identification of Medicinal Plants Using Deep Lerning” published in iJRASET , 2022.
18. Vijayashree.T, Dr. A. Gopal "Leaf Identification for the Extraction of Medicinal Qualities Using Image Processing Algorithm" published in International Conference on Intelligent Computing and Control (I2C2), 2017.