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A Review On Medical Identification System Comparing Different Deep Learning System

Sowmiya.E[1], Hari Triya A[2], Dharshini K[3], Archana T[4]

1 Assistant Professor, Vivekanandha College of Engineering for Women, Tiruchengode, Tamilnadu (India)

2,3,4Student Of Vivekanandha College of Engineering for Women,Tiruchengode,Tamilnadu (India)

Abstract— A deep learning-based systems was developed to identify medicinal plants in the Borneo region in real time. The system used techniques like class weighting and focal loss function to improve the model's learning process. In the future, we meant to further develop the systems performance by developing the sample collection of training data. Furthermore, to make system more useful, we meant to increase the number of species, as the Borneo region is a high species diversity spot. A medicinal plant is a high importance for human health. Medicinal plants are widely used as mixture of traditional medicines in non-industrialized societies, folk medicines readily available and cheaper than modern medicines. In ancient times, herbal medicines were also prevalent in Borneo regions. A medicinal plant is that species of the plant kingdom, whose parts (flowers, leaves, roots, stems, fruits, or seeds) are directly used or used in some preparation as a medicine to treat a condition or disease. A vision-based systems can support research and ordinary people in recognising herb plants quickly and accurately. This study purposes an intelligent vision-based systems to identify herb plants by developing an automatic Convolutional Neural Network (CNN). Hence, the proposed method effectively identifies in real time and can replace traditional method.

Index Terms— Deep learning, Convolutional Neural Network, folk medicines.

1. INTRODUCTION

Deep learning is based on neural network, which is a subset of machine learning, it involves representation learning. Plants are the valuable source of medicine. Medicinal plant has a played a crucial role in human health care for centuries. Medicinal plants are also used widely in the health care system of most the world's population. In deep learning, there are two primary classifications methods: supervised learning, which utilizes label data for guidance, and unsupervised learning. Exploiting deep learning to enhance and automate the classification and recognition of medicinal plant species underscores as strong collaborative potential between ongoing botanical research and the application of deep learning techniques.

Recent research review has been conducted to investigate the application of deep learning in the classification of medicinal plants. This article primarily focuses on the use of deep learning techniques to classify medicinal plant species. Our systematic review is fundamentally systematized about five key research questions associated with deep learning of research. Predominant interest is to identify best practices and promising research direction for applying deep learning frameworks to medicinal plants species classification and recognition tasks.

Deep learning-based classification of Bangladeshi medicinal plant using neural ensemble models. Plants have been utilized for their medicinal properties for centuries. In Bangladesh alone, there are approximately 449 recognized medicinal plant. Traditional methods like support vector machines random forest have limitations in classifying medicinal plants. Convolutional neural networks (CNNs) excel has extracting high level features. AI based approach for medicinal plant identification using deep CNN based on global average pooling. Medicinal plant having used in traditional medicine practises for long time because of their nutrients and medicinal properties. Due to their bioactive components such as phenolic, carotenoid, anthocyanin, and other bioactive components, such as their antioxidants, antiallergic, anti-inflammatory,

antibacterial properties. According to medicinal plants statistics, about 14-28% of all plants have medicinal uses. Furthermore about 3-5% of patients in developed countries, and over 80% in the rural population in developing countries and about 85% of populations in Southern Sahara use medicinal plants treat their disease because of their properties.

Efficient net ensemble learning: identifying Ethiopian medicinal plant species and traditional uses by integrating modern technology with ethnobotanical wisdom. Ethiopia is well-known for its rich biodiversity, which includes vast array of medicinal plants with significant therapeutic potential. According to the World Health Organization (WHO), traditional encompasses the collective understanding, beliefs, and practices employed to identify, prevent, and address physical, mental, or social imbalances. Deep convolutional neural networks VGG16, VGG19, and Dense Net201. This network extracted further from a comprising leaf image across 30 plant classes.

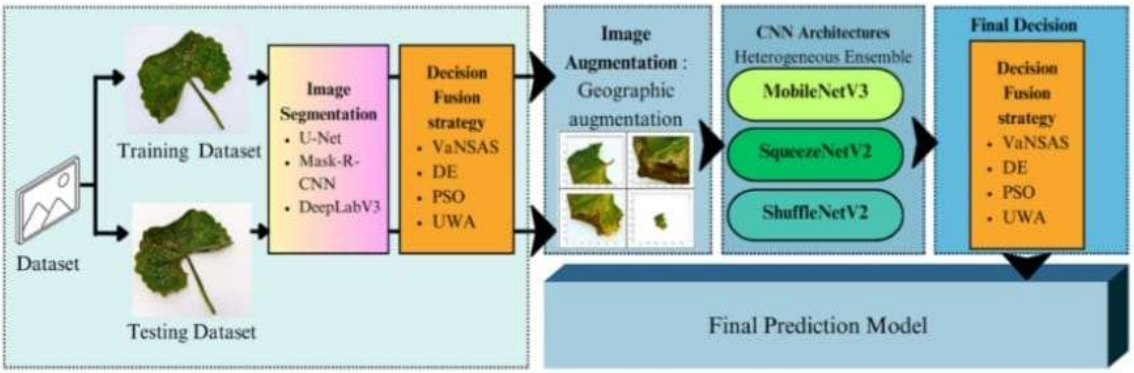

Fig.1 Frame work of the proposed model

Two-stage ensemble deep learning model for precise leaf abnormality detection in centella asiatica. Agriculture is a vital pillar of many economics, facing, significant challenges due to climate change. Centella asiatica (Linn)urban (CAU), commonly known as Gotu Kola particular interest due to extensive medical properties. Currently leaf diseases detection in plants, including CAU, relies on visual inspection by human experts such as agricultural professionals and botanists. Pitakaso introduce the Variable Neighbourhood Strategy Adaptive Search (VaNSAS) offering a promising alternative to AMIS with a comparable solution quality and reduced computational time.

Automated real-time identification of medicinal plants species in natural environments using deep learning models from Borneo region. Plant species identification is a challenging task that has a key rolling effectively study biodiversity and investigating unknown species. Convolutional neural networks (CNNs) and various deep CNN have been reported to the most used methods in automation process of plant classification tasks. Automated diagnosis of 10 most common tomato leaf diseases using mobile application. Recently transfer learning has been successfully deployed in mobile application to enable the detection of tomato leaf disease, reporting detection accuracy of over 96% using Efficient Net -B0 DL model. Convolutional Neural Network have found large success in vision problem such as classification and object detection.

Medicinal plant classification using particle swarm optimize cascaded network. Medicinal plant where primary source of medicine in ancient times unstill or globally valuable sources of new drugs. An estimated 350, 000 medicinal plants exist worldwide, which is 10% of all vascular plants. In Bangladesh more than 116 types of medicinal plants are reported by the experts. The development of cascaded network of medicinal plants classification in the site of plants from smart phone captured plant images, an analysis of the pre-trained CNN-PSO-traditional classifier-based cascaded approach for the classification of medicinal plants.

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2. RELATED WORK

Pre-processing techniques: to enhance the quality of images and reduce memory cost the paper propositions and apply various preprocessing techniques to the data set. Development of neural network architectures, the paper presents 3 novel neural network architectures specifically designed for the medicinal plant's identification. The DRCD model achieve the highest accuracy of 97%, surpassing the benchmark performance of individual models (Malik et al., 2022). In mobile application Medicinal plants which utilized deep learning techniques and CNN model for real time identification of medicinal plants. They achieved an accuracy of 95% using dataset of 1000 classes in each class(Malik et al., 2022). The early accurate detection of leaf diseases in crop like C.asiatica(CAU)is crucial for maintaining agricultural productivity and food security. This modern approach including the use of transfer learning with pre-trained models and image processing techniques, have marked a significant shift disease detection methodology (Sangeetha et al., 2024). This research covers two essential aspects highlighting its contributions. The first aspect concerns existing methodologies for detecting leaf disease or abnormalities in plants especially in CAU. The second aspect explores the emerging field of deep learning- based ensemble techniques, specifically examining relevant studies that employ ensemble models for early disease identification (Sangeetha et al., 2024). the deep learning faces several challenges, including the need for high-quality labelled data and lack of standardized protocols for dataset preparation. The lack of an available universal medicinal plant dataset is also one of the challenges observed in the field. Deep learning methods in the classification and identification of indigenous medicinal plant species based on plant leaves (Hajam et al., 2023).to start the process of plant species identification the first step involved collecting the data set. A qualitative study was conducted to identify suitable medicinal leaf dataset sources and dataset format. The selection of a influenced by several factors, including the nature of the problem, the availability of data the diversity of the data, and the relevance to the application(Kiflie et al., 2024).the utilization of an ensemble deep learning model, combining multiple CNN outputs, result in improved accuracy and robustness in the CAU leaf abnormality classification system(Kiflie et al., 2024).CNNs have gained prominence due to their ability to automatically detect plant diseases(Kiflie et al., 2024)in China traditional herbal medicine has been well recognized by more and more people and nations. The effect of the herbal medicine on symptom remission have been studied by many researchers (Liu et al., 2019) these networks are an advanced version of artificial neural networks (ANNs)that can be perform images processing operations such as object identification, segmentation, and classification. CNN model are made up of several layers(Buakum et al., 2024)it is still difficult to distinguish medicinal herb from other plants even with vision-based systems that have significantly improved their ability to extract complex features and select the most important conventional Machine Learning(ML) CNN and latent Dirichlet allocation(LDA) based model to construct a

prescription from leaf images(Kiflie et al., 2024),(Liu et al., 2019)Convolutional Neural Network(CNN) is one of the most successful DL methods in which it has been associated with excellent efficiency in image segmentation and pattern recognition(Buakum et al., 2024)The threats to traditional medicine are exacerbated by the diminishing indigenous knowledge of medicinal plants.

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4. METHOD

In this research, the parts and traditional uses of Ethiopian indigenous medicinal plants we employed a custom dataset. We harnessed the power of various Efficient Net frameworks using a majority voting-based ensemble learning approach. For the training of our deep learning models, this utilized Google Colab Pro+. (Uddin et al., 2023)This computational resource facilitated our model development and training process.
The writing process of this article was significantly enhanced through the use of advanced language processing AI tools. Grammarly, prominent for its sophisticated grammar and style suggestions, played a pivotal role in refining the overall clarity and coherence of the content.(Liu et al., 2019) The powerful paraphrasing capabilities of Quill Bot's AI tool played a crucial role in enhancing the quality and diversity of our written communication.

4.1.Convolutional Neural Network

In the domain of artificial intelligence has been made in recent years, particularly in the field of computer vision. Researchers have dedicated their efforts to unlocking the potential of machines in understanding and interpreting visual information such as images and videos. (Roopashree & Anitha, 2021)The application of deep learning in computer version has propelled the field forward, enabling missions to analyse interrupt and make intelligent decisions based on visual input.

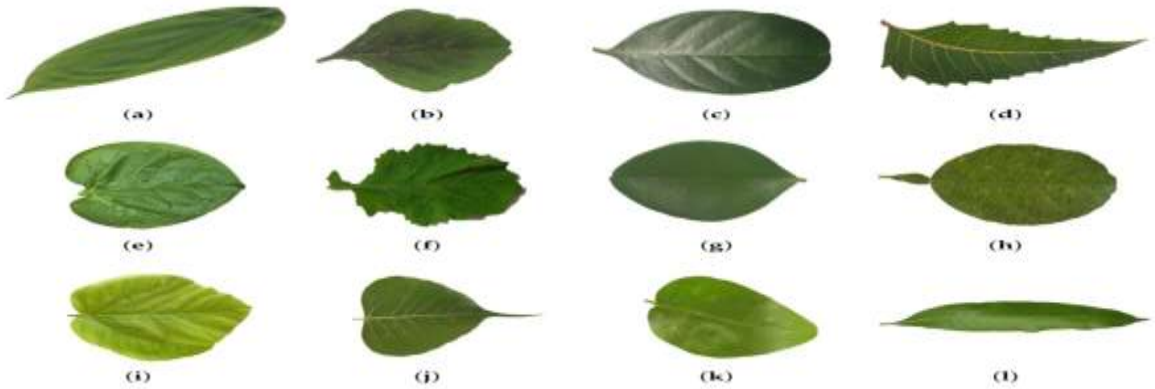

Fig.2 Showcases a sample of the medical leaf

5. RESULT

During this stage of research, we utilize advanced deep learning models and applied the transfer learning approach to address the identification of challenges of Ethiopian indigenous medicinal plant parts and their associated uses. Transfer learning is widely adapted technic that offers significant advantages in terms of training time and performance. Training the selected models from starch can be time consuming, even on powerful GPU machines. With transfer learning we can build up the knowledge gained from pre-trained models and expedite the learning process. Employing Efficient Net lies in the demonstrated superiority in achieving enhance accuracy and computational efficiency compared to earlier conv Net. Ensemble learning harnesses the strength of diverse machine learning algorithm, training them independently on the same data. The hard ensemble model, utilizing majority voting to amalgamate predictions from multiple models. This fusion of predictions from diverse models significantly enhances overall accuracy. Hyper-parameter setting play a crucial role in the training process and overall performance of each model. The learning rate controls the step size in parameter updates while the learning rate decay factor reduces the learning rate over time to fine-tune the model. The proposed method outperformed the existing methods in average accuracy. Therefore, many researchers' development large datasets and implemented CNN for medicinal plant classification. Several medicinal plant classification methods were previously development utilized CNN-based models. The proposed ensemble deep learning model specifically designed for the classification of leaf disease classification represents a valuable enhancement.

This research has significant policy implications for the agricultural sector. The high accuracy and generalization capacity of proposed model can aid in the early detection and effective management strategies to make informed decisions and optimize agricultural outcomes.in addressing the critical challenges of accurate disease detection in agriculture fields, our research introduces a novel two-stages ensemble model that synergistically combines segmentation and classification techniques. Our approach not only demonstrates the facility of combining multiple deep learning model for agricultural disease detection but also underscores the importance of a systematic, two-stage process where segmentation and classification tasks are effectively interconnected. This methodology ensures that the classification stage is primed with the highest quality inputs, significantly reducing the likelihood of false positives influencing the final disease identification, thereby paving the way for more reliable and actionable insights in precision agriculture. Ensemble approaches for classification performance the deep neural network models, the exploration turned towards ensemble techniques for further refinement. Specifically, two ensemble approaches, namely averaging and weighted averaging, were employed to combine the strengths of individual models. This culminated in the certain of diverse ensemble models that revealed enhanced classification capabilities. These models where selected due to their innovation architectural approach, characterized by a unique scaling method. Furthermore, transfer learning allows us to freeze certain layers of the model while training the remaining layers leading to more accurate results.

6. CONCLUSIONS

In this contemporary world, traditional medicines have gained importance due to the high cost and potential negative impacts of allopathic medicines. Medicinal plant classification is usually carried out by plants taxonomists. The human-centric nature of this approach can introduce inaccuracies or errors in judgment.The outcomes of the research hold significant implications for various fields, including medicinal research, biodiversity conversation, and agricultural practices. Accurate identification of medicinal plant species is crucial for harnessing their therapeutic potential. In this study, deep learning-based system was proposed to perform a real time species identification of medicinal plants found in Borneo region. The proposed system addresses some of the key challenges when training deep learning model. We address the limitations of traditional leaf diseases detection methods in CAU by introducing a novel assembling deep learning approach. a proposed method utilizes two-time decision fusion strategies to integrate multiple machine sectors. By continuously advancing research in this direction, we aimed to contribute to the ongoing development and application of cutting-edge technologies in agriculture.In the future, they have plan to extend the dataset by collaborating with experts in botany and herbal medicine to include the border range of medicinal plant species found in Bangladesh addressing the limitations of dataset size. In this paper, they proposed and automatic medicinal plant classification method for Bangladesh. Furthermore, to make the system more useful we intend to increase the number of species as the Borneo region is high species diversity spot.

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