Chapter 8
Medicinal Plant Identification Using Machine Learning Techniques:
Automatic Recognition of Medicinal Plants

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ABSTRACT

In this world there are thousands of plant species available, and plants have medicinal values. Medicinal plants play a very active role in healthcare traditions. Ayurveda is one of the oldest systems of medicinal science that is used even today. So proper identification of the medicinal plants has major benefits for not only manufacturing medicines but also for forest department peoples, life scientists, physicians, medication laboratories, government, and the public. The manual method is good for identifying plants easily, but is usually done by the skilled practitioners who have achieved expertise in this field. However, it is time consuming. There may be chances to misidentification, which leads to certain side effects and may lead to serious problems. This chapter focuses on creation of image dataset by using a mobile-based tool for image acquisition, which helps to capture the structured images, and reduces the effort of data cleaning. This chapter also suggests that by ANN, CNN, or PNN classifier, the classification can be done accurately.

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INTRODUCTION

In the world there are so many plant communities, so many plants have therapeutic and healing values. By using these medicinal values, they are preparing different medicines especially in Ayurvedic medicines only plant species are used. To use the plant species for medicinal purpose, this is necessary to recognize and classify plants correctly. Identification of Anonymous plants is a challenge to everyone. Based on morphological characteristics, plants can be easily identified manually by the botanist, consumers, forestry services, taxonomists, physicians, pharmaceutical laboratories. But this process of identification is time consuming and also need so many labors. So much of Research had been done on recognizing medicinal plants, as a result no there are so many methods of identification of the medicinal plants by using machine learning is available.

In this paper, we deal with two methods of feature extraction, one is Automatic Recognition of Medicinal plants, here first should take photograph of every leaf with white background, then remove any noise. Next different basic features of the leaf image have to be extracted, based on these features compute derived features. The formulae are also given below.

Another one is Image processing technique to identify Medicinal plants. Here first need to take photograph of both front and back side of the image. We may extract features by using green leaves or by using dried leaves also, but dried leaves are somewhat difficult to extract features. First need to find out Centroi-radii distance, after that need to collect different features of the image.

After extracting the image features then need to classify the medicinal plants. This paper proposes Artificial Neural Networks, Convolution Neural Network and Probabilistic Neural Network. Because images are non-linear, Neural Networks is best classifier to deal with non-linear problems. It is very reliable and exhibits more accuracy. It extract and identifies the features concurrently, it recognizes very fast. These three are very robust classifiers. Even though all have benefits, this paper proposes to CNN, it can do concurrently. By using altered featured vector CNN can able to process on damaged samples also and able to give accurate results.

RELATED WORK

Manojkumar P. Surya C et al (Begue et al., 2017) used Machine Learning algorithm with Weka tool for identification of Medicinal Plants, collected 20 random Ayurvedic leaves, extracted Texture and Color features from the color and binary images. Based on the features SVM and Multilayer perception classifiers are used to identify the Medicinal Plants, got 94.5% accuracy.

Adems Begue et al (Sona & Jaya, 2015) used Automatic Identification of Medicinal plants to identify leaf features. Tried different classifier, got 90.1% of accuracy from Random forest classifier.

Sona O M and R Jaya (Sandeep, 2012) developed a Mobile App, based on leaf images, this system identifies Medicinal Plants. They used Gray-Level Co-occurrence Matrices (GLCM) for taking out the texture features of the plant image and also used for plants species image processing technique for classification of the plants. Got 94.7% accuracy by the combination of The SGD, DT and k-NN classifiers

For identification of Medicinal plants Iyan Mulyana et al developed an automatic system in Indonesia. By using fractal dimension and fractal code methods leaf features was extracted. Based on fractal code (79.94%) and fractal dimension (85.04%) Clusteing Fuzzy C-Means classifier used for plants species