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Identification of Medicinal Plants in Forest Area - Pattern Recognition Approaches

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ABSTRACT
Computers have contributed immensely in the identification of plants, where a real world plant images are taken and processed to extract the data from the images. This technique can be extended up to forestry, farming, botany and many allied fields. The crop growth, health analysis, disease detection, cure and detoxification are the most common applications. Plants can be used as detoxification agents but a very few medicinal plants are identified, which are available in specific regions in forest. The tribal use particular medicinal plants in a very appropriate proportion to cure many diseases. If proper methodologies are found to identify the medicinal plants, it will definitely help humans to improve their life and cure the diseases. Therefore, the medicinal plants available in the forest region are reviewed and its identification techniques are studied to develop suitable approach to further improve the system.

I. Introduction

Ayurveda is the ancient medical science of India, which is prevailing since last 5000 years. Ayurveda medical education for the purpose of conversation, domestication and use of medicinal plants is needed for the development of automated computer vision system for benefit of mankind. Hence, an automatic identification technique to recognize medicinal plants with their visual contents like images is the topic of this research.

II. Importance of Survey Area

In order to develop a system to identify plants of medicinal use, it is necessary to identify and register these plants to National agencies in India. The importance of plants present in particular region are mostly known to local tribe but they use these plants without having sufficient knowledge by following their tradition. Therefore, it is easier to collect information from the local tribes who are untouched by the modern civilization. By doing the work in this area and bringing this knowledge in main line of society is the strong motivation for the work.

India can be classified depending on its whether condition. The northern part of India is very cold and the temperature is generally below zero degrees centigrade in most of the part of year. Therefore, the plant families present in northern part of the India are from Cedar family. However, in southern part of India most of the time the temperature is well above 20 degree; hence the plants present in these area are completely different from the ones present in northern part of the India.

Apocynaceae, Arecaceae, Asclepiadaceae, Asteraeae, Caesalpiniaceae, Cucurbitaceae, Chenopodiaceae, Fabaceae, Lamiaceae, Liliace families and many more [5, 6] are found in forest area. These plants are well known medicinal plants for which roots, leaves, seeds and flowers (either one or all of them can be used in medicine[5-7]. Figure 1 shows the above variety of herbs.

Apocynaceae is a herb that categorize trees, shrubs, stem succulent and vines termed as the dogbane family name taken from the American plan called dogbane. The family members are usually from Australia, Europe, Nairobi and east Africa with some temperature member. The class Asclepiadaceous is considered a subfamily of Apocynaceae and 348 genera. The large number of species are tall trees found in tropical forest usually called as rainforest, but some grow in tropical dry air environments. The perennial herbs from various zones occur many times. Many of these plants have little milky latex, and many species are highly venomous if ingested.

Arecaceae are the from botanical class of plants of perennial climbers, shrubs, acaules and trees commonly term as palm trees. Generally they are flowering class of monocots behavior. There are nearly many species available in such class of plants. They are useful in terms of palms and can be used in various medicinal purpose. Date palm is usually taken as a food in long journey. Hyophorbe amaricayles is a rare palm. They are generally found in Mauritius.

Asclepiadaceae are the milkweed family generally in the group of perennial herbs and in the class of stem less order and having lot of uses related to medicines. They are generally identified by their patterns and outlook. They are usually found in dense forest. The main herbs, which required for the medicinal work are found in the forest. The hybrid culture are generally obtained from such herbs. There are many species of higher classification of this herbs. The fragrance of this flowers generally attract flies.

Asteraeae are available in large numbers. They can be easily identified by their charactertics, but sometimes it is difficult to identify typical species. The specific category of this class calendula can be used as herba tea and can be used in many food items. Due to their availability they are generally used in more numbers.

Caesalpiniaceae are called as peacock flower subfamily. They are especially from moist area specialized extra floral often present on the petiole.

Cucurbitaceae called as cucurbits are from gourd family. These herbs consist of many species all around. The important genera are Cucurbita, squash, pumpkin.

Chenopodiaceae are the flowering plants from goosefoot family. It is recognized all over the world due to its multiple uses.

Fabaceae is the economical and mostly important plant recognized all over the world. This classification mainly include trees and shrubs and they are called as perennial and herbaceous plants. They have fruits with the charactertic of flowers so it can be identified easily. They are having the third largest family with genera and species.

Lamiaceae and liliace are the plants used by tribes from many years as a medicinal herbs.

Figure 1. Different types of Herbs available in India [].

III. Literature Survey

Chavan and Margonwar[5] performed a ethnobotanical survey in range of "Markhanda Forest" which is part of the Gadchiroli, India. They investigated medicinal and other useful plants used traditionally by Gond and Madiya tribal people. They reported nearly 50 species of plants during their survey. The study showed that the most frequently used part of the plants in herbal remedies were fruits (28%) followed by leaves (24%), seeds and bark (10%), roots (9%) whole plants (7%) gum (2%) and rhizomes & bulbs (1%). They studied plants which are used for heart disease, cough, wound, diabetes, dental problem, jaundice, scorpion bite, etc.

Setiya [8] documented few scarcity food plants used by aboriginals. The authors documented 32 samples from 25 families with their use by the local tribal. The studied plants were herbs(4), shrub(3), trees(16) and climbers(9) distributed in total 25 families. Out of these families some families were dicots and 4 families were monocots. Majority of tribes consumed the fruits of the plants but tribes also consumed seeds, flowers, leaves and even underground petiole.

Shambharkar and Gogle[6] claimed that the local tribes in forest area uses a few plants for cancer treatment. They studied 25 plant species belonging to 20 different families which are used by the local tribes in cancer treatment.

Shende[9] carried out work on ethnobotanical studies of plants used by local tribes. The study disclose a number of species occurring in area to cure diabetes, jaundice, asthma, blood pressure, obesity, stomach disorder, and also to protect from snake bite. The author studied 36 plants species belonging to different 28 families, which can be used for improvement of human health.

It is seen that most of the medicinal plants are present in forest region and the knowledge of its use is transferred from one generation to another in the local people. Therefore, if appropriate documentation and identification technique about the medicinal plants is carried out, it will increase the knowledge, which will ultimately be useful to all human kind.

In order to know the state of art application of computer vision and Digital image processing techniques in the real world more specifically connected with plant recognition, Following are the works cited in literature.

V.Singh,A. Mishra[13] stated that the effect of agriculture development of directly related to economy. They classified the plants using image segmentation techniques and the detection of data was automatic.

R. Masood, S. Khan and M. Khan[12] focuses on critical analysis of different plant disease and segmentation techniques.

A. Rahman and I. Asaju[10] proposed a system called LEASYS[10]. They developed the system which is less time consuming and less cumbersome for plants identification. Plants were identified based on simple or compound leaves types.

A. Kadir, L. Nugroho, A. Susanta and P.I Santosa[11] share important aspects in recognizing plants. Compactness and dispersion or moments invariants were usually used to identify plants. In their research a comparative experiment of four methods to identify plants using shape features was accomplished.

This review indicates that pattern recognition techniques are used in many automation tasks related to plant domain. There are many application connected to plant image recognition however less work has been cited in the literature on the development of Computer Vision systems for identified classification and retrieval of unidentified plants which are used for detoxification not only related to human but also to the industrial waste.

IV. Observations

It is required to build a database of the medicinal plants and a high resolution plant images should be made available for this purpose. As he pattern recognition techniques are very few in this research area, the main emphasis could be to search for the unidentified herbs and develop a methodology to recognize them reliably. Once the plant is identified accurately, then the challenge remain is to find out the particular or general suitability of such herbs for the medicinal purpose.

V. Conclusion

Although medicinal plants available in India are plenty, the proper documentation and identification techniques are missing. Many districts have large forest area and it contains good amount of medicinal plants but very few of them are documented. This situation is commonly prevailing in all over India. This study helps to develop better identification techniques to recognize plants and document them for the help to the society.

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