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Identification of Ayurvedic medicinal plants using machine learning

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ABSTRACT

Identification of the correct medicinal plants that goes in to the preparation of a medicine is very important in ayurvedic medicinal industry. The main features required to identify a medicinal plant is its leaf shape, colour and texture. Colour and texture from both sides of the leaf contain deterministic parameters to identify the species. This paper explores feature vectors from both the front and back side of a green leaf along with morphological features to arrive at a unique optimum combination of features that maximizes the identification rate. A database of medicinal plant leaves is created from scanned images of front and back side of leaves of commonly used ayurvedic medicinal plants. The leaves are classified based on the unique feature combination. Identification rates up to 99% have been obtained when tested over a wide spectrum of classifiers. The above work has been extended to include identification by dry leaves and a combination of feature vectors is obtained, using which, identification rates exceeding 94% have been achieved.

1. INTRODUCTION

India and has its roots in the Vedic times, approximately 5000 years ago. The main constituents of ayurvedic medicines are plant leaves and other parts of plants like root, bark etc. More than 8000 plants of Indian origin have been found to be of medicinal value. Combinations of a small subset amounting to 1500 of these plants are used in Herbal medicines of different systems of India. Specifically, commercial Ayurvedic preparations use 500 of these plants. Over 80% of plants used in ayurvedic formulations are collected from the forests and wastelands whereas the remaining are cultivated in agricultural lands [1] In the ancient past, the Ayurvedic physicians themselves picked the medicinal plants and prepared the medicines for their patients. Today only a few practitioners follow this practice. The manufacturing and marketing of Ayurvedic drugs has become a thriving industry whose turnover exceeds Rs 4000 crores. The number of licensed

Ayurvedic medicine manufacturers in India easily exceeds 8500. This commercialization of Ayurvedic sector has brought in to focus several questions regarding the quality of raw materials used for Ayurvedic medicines Today the plants are collected by women and children from forest areas; those are not professionally trained in identifying correct medicinal plants. Manufacturing units often receive incorrect or substituted medicinal plants.

2. LITERATURE REVIEW

A.Gopal et.al [1] implement a system using image processing with images of the plant leaves as a basis of classification. The software returns the closest match to the query. The proposed algorithm is implemented and the efficiency of the system is found by testing it on 10 different plant species. The software is trained with100 (10 number of each plant species) leaves and tested with 50 (tested with different plant species) leaves. The efficiency of the implementation of the proposed algorithms is found to be 92%.

Umme Habiba et.al [2] In this paper, for automatically classifying medicinal plants, they present a Multichannel Modified Local Gradient Pattern (MCMLGP), a new texture-based feature descriptor that uses different channels of color images for extracting more significant features to improve the performance of classification.Auther have trained their proposed approach using SVM classifier with arious kernels such as linear, polynomial and HI. In addition, used different feature descriptors for comparative experimental analysis with MCMLGP by conducting the rigorous experiment on our own medicinal plants dataset. The proposed approach gain higher accuracy (96.11%) than other techniques, and significantly valuable for exploration and evolution of medicinal plants classification.

R.Janani et.al[3] have proposed a method for the extraction of shape, color and texture features from leaf images and training an artificial neural network (ANN) classifier to identify the exact leaf class. The key issue lies in the selection of proper image input feature to attend high efficiency with less computational complexity.

3. SYSTEM ANALYSIS

3.1 EXISTING SYSTEM:

Medicinal plants are used as traditional herbal remedies for some illnesses and disorders such as diabetes, sweating and bleeding, regulation of the menstrual cycle, and reduction of extensive hemorrhage, stomach pain, inflammation, and toothache medicines take too much time to

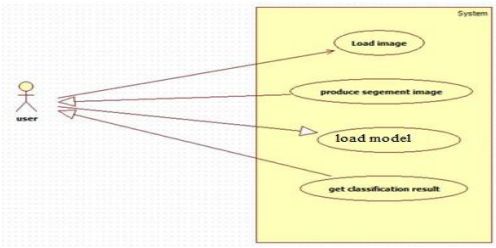
act, and the entire process is very slow. They contain various ingredients which sometimes causes allergic reactions. Herbal medicines are not good for serious cases such as heart attack and broken bones. These medicines are also ineffective in sudden illnesses and accidents.

3.2 PROPOSED SYSTEM:

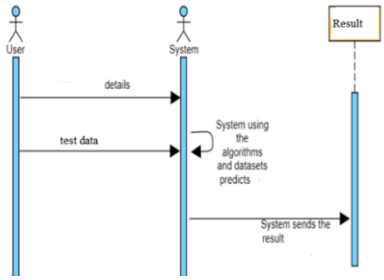
It was easy for people in the earlier times to identify these leaves and map them to ailments. Using the latest technologies like Machine Learning and Deep Learning, we have explored a technological way of identifying these leaves for all the naive users. In this paper, we have described the implementation of Convolutional Neural Networks (CNN) for the identification of Indian medicinal leaves.

4. SYSTEM DESIGN

4.1 USE CASE DIAGRAM



4.2 SEQUENCE DIAGRAM



5. IMPLEMENTATION

5.1 Input and Output

Input design is a part of overall system design. The main objective during the input design is as given below:

To produce a cost-effective method of input.

To achieve the highest possible level of accuracy.

To ensure that the input is acceptable and understood by the user.

Functional requirements

Outputs from computer systems are required primarily to communicate the results of processing to users. They are also used to provide a permanent copy of the results for later consultation. The various types of outputs in general are:

External Outputs, whose destination is outside the organization,.
Internal Outputs whose destination is within organization and they are the
User's main interface with the computer.

Operational outputs whose use is purely within the computer department.

Interface outputs, which involve the user in communicating directly.

Understanding user's preferences, expertise level and his business requirements through a friendly questionnaire.

Input data can be in four different forms - Relational DB, text files, .xls and xml files. For testing and demo you can choose data from any domain. User-B can provide business data as input.

Non-Functional Requirements:

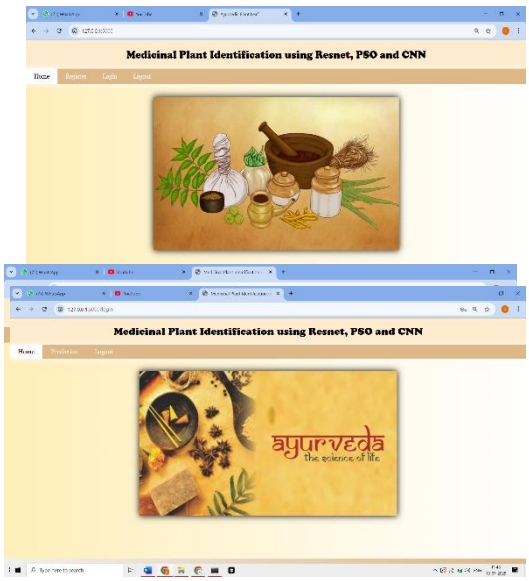
Secure access of confidential data (user's details). SSL can be used.

24 X 7 availability.

Better component design to get better performance at peak time

Flexible service based architecture will be highly desirable for future extension

6. SCREENSHOTS



7. CONCLUSION

A novel method for identification of Ayurvedic medicinal plants from images of front and back side of leaf has been proposed. The work is based on a database of leaf images of medicinal plants created by the authors. Unique combinations of morphological, colour and texture feature have been identified that maximizes identification rate of green leaves. a unique methodology for identification of Ayurvedic medicinal plants from images has been proposed. A unique combination of geometric, color and texture feature have been identified to maximizes the accuracy of identification.

In this work, a novel strategy to identifying Ayurvedic medicinal Plant leaf categorization was investigated using deep learning approaches. The ultimate recognition rate is 96 percent, although the result can range from 92 percent to 97 percent based on the results. People in our digital era have access to the internet, but many do not have access to adequate medicine or health care. This CNN (Convolutional neural network) application aims to provide individuals with knowledge about Ayurvedic plants that can be discovered

8. REFERENCES

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