Classification Of Selected Ayurvedic Leaves To Detect It's Medicinal Values

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ABSTRACT

Plants play a significant role in day to day life providing all basic necessities. Many plants have high medicinal values from the root to its leaf and can be used as cure for many threatening diseases. Due to some hazardous factors many such plants are on the verge of extinction and lack of awareness of medicinal values leads to many ayurvedic plants going unnoticed. Therefore, identification of such leaves is of utmost importance. Manual identification is highly time consuming and requires help from specialists. Hence there is an urgent need of an automated tool for easy identification and classification of ayurvedic leaves using available information. The main features required to identify the leaves are its colour, venation, texture and shape. This paper focuses a computer vision approach on the identification of leaves having medicinal qualities based on major features that has been taken from the images of the leaves.

Keywords:

Medicinal System, Ayurvedic Leaf Recognition, Grey level co-occurrence matrix, Shape features, Computer Vision, Machine Learning.

1. INTRODUCTION

Ayurveda is one of the ancient systems that is originated in India. Ayurveda medicine is the best cure to most of the diseases. The leaves of the Ayurvedic plants plays a major contribution in curing most of the diseases. Many people in the past knew about the various Ayurvedic plants and its uses. Most of the Ayurvedic plants were found in forests and a few of them were found in the agricultural fields.

Before, Ayurvedic doctors themselves picked the leaves and arranged the medications. But recently only a few of them do this task and most of the people are not well aware of the medicinal value present in the Ayurvedic plants. Even though we come across various Ayurvedic plants in our day to day life, we are not very well known about the medicinal value present in them. The aim is to preserve this knowledge about Ayurvedic leaves. For this purpose, an automated system is developed using computer vision which will identify various leaves and detect its medicinal value.

The first step towards identification of the leaf is capturing its images. The captured image is pre-processed as per our requirement. Form the captured image various features are extracted and this is compared with the features that are obtained from the stored image. Features are such as eccentricity, color, axial length, entropy, dispersion compactness, radial length, shape and so on are extracted using various algorithms. If there is a match in the test image, the required result is generated.

2. LITERATURE SURVEY

The work led is to perform programmed acknowledgment of restorative plants, just as to dissect the factual idea of the picture highlights utilized for acknowledgment [1]. Ten plant species including plants be-yearning to similar families were utilized for the exploratory investigation. Progressively restorative plant species were considered and it was demonstrated that the leaf highlights are Gaussian conveyed, which filled in as a valuable outcome in exact classifier configuration by ascertaining the exact choice limits between the classes. This work is a commitment to-wards serving cultivation in India and an endeavor towards a quicker and better methods for recognizing restorative plant species.

The work led is to actualize a calculation for robotized distinguishing proof of restorative leaves by contrasting and the database leaves [2]. The surface highlights are utilized for the examination of the le.aves. This robotized grouping is productive and genuinely solid. The exactness gotten by the program is 94% when each of the 11 highlights are utilized and is 91% when the chosen 4 highlights are utilized. Future work can be focused at finding the most productive mix of the surface highlights for snappy and dependable distinguishing proof. Other surface highlights can likewise be removed and a mix of most productive surface highlights for characterization among the new surface highlights can be utilized.

The work directed is proposed and executed a framework for programmed recognizable proof of therapeutic plants from their leaves [3]. The proposed framework utilizes PC vision and AI ways to deal with distinguish a pre-prepared

therapeutic plant from its leaf. Principle feature of this work is the non-utilization of normal shape and shading highlights of leaves which are computationally costly to extricate as they are spatial highlights. The proposed framework utilizes a mix of SURF and HOG highlights which gave almost 100% of exactness when tried different things with k-NN classifier. Degree for future work incorporates growing the leaf dataset, changing the classifier from k-NN to SVM or ANN and to explore different avenues regarding a mix of more highlights included with HOG and SURF.

The work depends on a database of leaf pictures of therapeutic plants made by the creators [4]. Special mixes of morphological, shading and surface element have been recognized that expands distinguishing proof rate of green leaves.

The work led by [6] is to locate the careful match of the leaf with test parameters. Here of 11 highlights are taken at first. The surface examination is finished with the morphological preparing which is only the organizing components of twofold pictures. The highlights are extricated with the GLCM strategy. The test picture is contrasted and every one of the pictures spared in the database. The one with least difference is shown as the yield. The future work is to frame the database with all home grown therapeutic leaves. The following part is proceeded with the vein qualities which are considered as the mark parameter of the leaf and the highlights needs to separate for the equivalent.

The work directed in [7] is to presents a similar investigation of classifiers utilized in leaf acknowledgment calculation. The similar investigation considers both hypothetical and exploratory angles, and checking for proficiency and viability. A major test for leaf pictures include descriptors, particularly with regards to comparable leaf pictures.

The work led in [8] is to locate the most proficient blend of surface highlights for brisk and solid distinguishing proof. A bigger database will guarantee better unwavering quality. For surface investigation shape, surface, element and venation of leaf are to be attempted. The principle point is that it should give a consequence of 100 % exactness. The future work to be done is the arrangement of database. After the development of database the highlights are to be extricated utilizing dim dimension co-event network (GLCM) or chief part investigation (PCA) strategy or utilizing any procedure. At that point the test tests are taken and contrasted with the database with distinguish the nearest coordinate. The recognized leaf is to be named. Utilizing Arduino the recognizable proof is to be executed which makes the framework significantly more userfriendly. The work is begun to frame the database in arduino likewise at the same time. Especially the vein parameter is to be concentrated for which is the mark parameter of any leaf. The procedure is begun and it will be completed in future.

The work led in [9] centers around different existing computerized frameworks for plant grouping and acknowledgment. Acknowledgment is a technique intended for the task of each individual leaf picture to its separate plants with respect to their customary characteristics. In PC vision, PC supported plant acknowledgment is as yet a testing errand as a result of insufficiency of proper methodology or portrayal plans. An effective element extraction calculation alongside a powerful classifier is required for accomplishing a decent acknowledgment rate. In this paper different strategies for leaf ID have considered and clarified. The examination demonstrates that the exploration for distinguishing proof of therapeutic plant is done mostly in picture preparing space.

The work directed proposes a straightforward and productive procedure for Ayurvedic plant characterization utilizing computerized picture preparing and machine vision innovation [11].The three noteworthy stages in proposed strategy are pre-handling, include extraction and arrangement. The proposed philosophy is tried with 208 diverse example leaf pictures of 26 unique species and saw positive reaction as a rule. Through this work, physical work required and time required to perform Ayurvedic species acknowledgment can be diminished. The proposed work can be stretched out to discover the deserted leaves to build the accu-indecent.

The work led proposes an automat-ic arrangement strategy dependent on leaf pictures of therapeutic plants to address the limi-tation of manual grouping technique in distinguishing restorative plants [12]. This ap-proach will first preprocess the leaf pictures of restorative plants; at that point it will register the ten shape include (SF) and five surface attributes (TF); at long last, it will characterize the leaves of therapeutic plants utilizing bolster vector machine (SVM) classifier. The classifier has been connected to 12 distinctive restorative plant leaf pictures and the accu-scandalous was 93.3%. The outcome demonstrates that it is attainable to naturally arrange me-dicinal plants by utilizing multi-include extraction of leaf pictures in mix with SVM. The paper gives an important hypothetical structure in the exploration and de-velopment of restorative plant grouping framework.

The work directed presents writing on picture genius cessing strategies utilized in distinguishing proof and arrangement of therapeutic plants and furthermore the significance and advantages of restorative plants as of late [13]. Programmed recognizable proof and arrangement of restorative plants will give therapeutic learning to average citizens and ranchers which helps in expanding creation of such basic plants. This programmed order framework additionally helps buyers, pharmaceutical organizations and Ayurveda practioners to recognize and group the restorative plants with no human help.

The work directed presents a methodology where the plant is recognized dependent on its leaf highlights, for example, territory, shading histogram and edge histogram [14]. Test examination was directed with couple of therapeutic plant spe-cies and the outcome turns out to be a straightforward and a productive endeavor. This proposed calculation is limited for pictures of develop leaves of a plant. Likewise here white foundation is kept up both for the database and test pictures. With this limitation framework accomplished better precision. Consequently we can actualize picture genius cessing strategy

for ID of Indian therapeutic plants with less human in-duced mistakes.

3. PROPOSED METHODOLOGY

This area gives an itemized depiction of the proposed work. The proposed system has been developed in six phases (see Fig. 1).

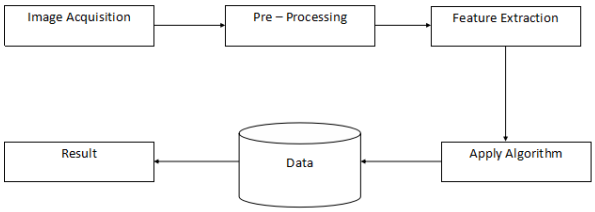

Fig. 1: Block diagram of the Ayurvedic Leaf Identification system

3.1 Image Aquisition

First the picture of the leaf is caught utilizing a camera. Here we are using the IP Webcam app which is used in the smartphone to capture the leaf images. The image is captured using the white background and at a distance of 30cms from the leaf image. This captured image is further used to detect the various leaf features.

3.2 Pre-Processing

To enhance the quality of an image and for the noise reduction, we use a filtration method which is the Gaussian filter. Segmentation method is done to crop the input leaf image to the desired size. Other morphological features are also used for better improvement of the image. Morphological features are applied to the gray scale and binary images of the input leaf.

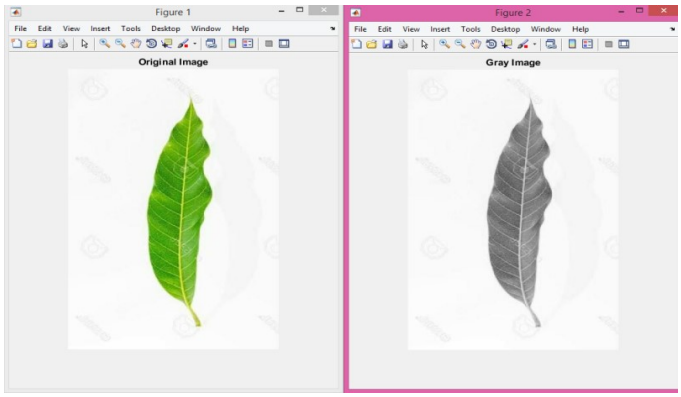

Fig. 2:Translation of input image to grey scale image

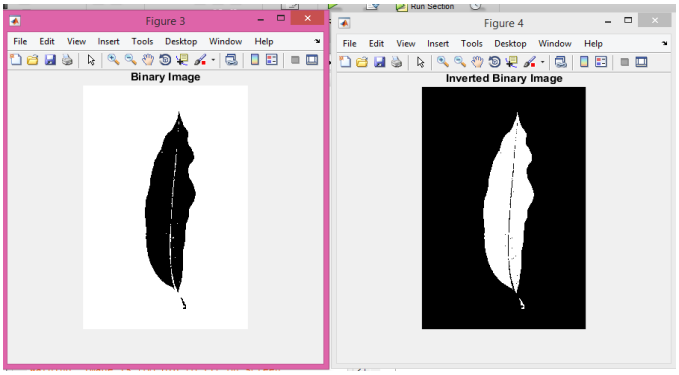

Fig. 3: Conversion of test image to binary image and inverted binary image

3.3 Feature Extraction

The various features extracted from the test image are as follows.

1. Area of the leaf image: Using the binary image which was obtained from the Pre-processing stage, we find the area of the leaf.
2. Length and Width of the leaf image: By using the binary image which is given as the output from the preprocessing stage, we calculate the length and width of the leaf image obtained.
3. Color of the image: Using the histogram feature of matlab, we find the amount of the green color present in the leaf image.
4. Roundness: By using the parameters such as the area of the leaf and the length of the leaf, we obtain the roundness of the leaf image.
5. GLCM: To obtain the amount of the distribution of the pixels in a leaf image, this method is used.
6. Aspect Ratio: By using the parameters such as the length and width of the leaf, the aspect ratio can be calculated.
7. Rectangularity: By using the parameters such as the length, width and area of the leaf, the aspect ratio can be calculated.

3.4 Data

50 leaf samples are stored in the database and its features are extracted individually. These feature values are stored in the csv file and this is used for further calculation. The names of various leaves, its images and its uses In the medicinal field are stored In the database.

3.5 Result

After the feature extraction, if there is a match in the tested image and the stored image, then the result will be generated. The result includes the name of the leaf, its image and its medicinal value.

4 RESULTS AND DISCUSSION

First the software opens the interface which is created to start the process. There will be a set of options that will be provided in the interface such as to capture the test image, to display the

compared images etc. Using the first option, we capture the test image. This image is passed on to the further stages for comparision. First the color of the image is checked with the histogram feature and the value is noted down. Next the test image is converted into grey scale image. For the grey scale image, the GLCM method is implemented to obtain its value (see Fig. 4). Further, the grey scale image is converted into binary image. For the binary image, we have implemented the Canny edge detector algorithm (see Fig. 5). From this algorithm, the edges of the leaf images are detected. Using the edge values, we can get the axial length, aspect ratio, eccentricity feature values etc. All the obtained values are compared with the values stored in the csv file. If the value matches approximately, then the result will be generated i.e., the name of the resulting leaf, its images and the medicinal value of the leaf is displayed in the interface.

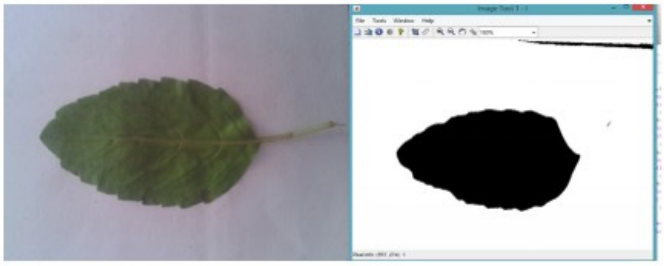

Fig 4: GLCM method for identification

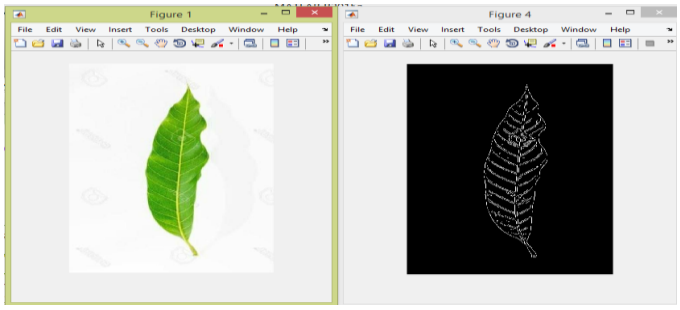

Fig 5: Canny Edge Detection method for identification

5 CONCLUSIONS

This paper proposes an automated tool to identify and detect the medicinal value of the leaves. The captured image is compared with the database images and result is generated. The geometrical and texture features are used for leaf identification. Scope of future work includes expanding the data set, adding the origin of the leaves, increase the number of features used including venation of the leaves, radial distance etc. for better result of the system. One major draw back was that the proper result was not generated when the leaf images were rotated. In this way, future work can be guided in a manner to beat this disadvantage.

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