A SMARTPHONE APPLICATION FOR DETECTING DISEASE IN LEAF USING IMAGE PROCESSING

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ABSTRACT- A Smartphone image processing application for Leaf care is responsible for recognition of plant diseases, and also used to automatic recognition of plant species. The agricultural production cost can be increased if plant diseases are detected and cured in their early stages. The plants have to be monitored all the time in order to detect the first symptoms of a disease before it is spread to the whole crop It can affect the product quantity, quality or productivity and serious effects on plants if the plant is not properly taken care. Detection of plant disease through a smartphone application is beneficial as it reduces a large work of monitoring in big farms of crops, and at very early stage itself we can detects the symptoms of diseases, when they appear on plant leaves. This project recognition of a disease can often be based on symptoms like lesions or spots in different parts of the plant. The diseases affected in the plant area, is detected by the color and the number of these spots in the leaf. Higher cost molecular analyses and tests can be also performed. This application can be extended for different smart phone platforms and different plant diseases.

I. INTRODUCTION

Recognizing plant species from leaf characteristics is a very challenging and appealing task. The global shortage of expert taxonomists increases the demand for the software tools to characterize and recognize plants from images. Plantopedia is necessary under these circumstances not only for taxonomists but also for people to have better understanding on the plants around us. contour comparison and matching aspect ratio are done to find out the plant's species .Future enhancements can be done to improve accuracy and include more leaves in the

leaf dataset. Plantopedia works in auto-recognition mode in which plant species are identified by analyzing the images and comparing itwith available dataset and in manual-recognition mode where the user must specify leaf and node of the leaf are been characteristics for the application to identify the leaf that will Match the description and interoperability is also supported. The application was developed in android 3.3and is compatible in any higher versions. This application features are simple and user-friendly interface and is faster when compared to the other applications because it avoids the basic point to point matching algorithms. In case of a hierarchical structure of the relations, it might result in more number of classes and it leads to an more complicated structure. Therefore we are transforming the hierarchical relation structure to a simpler structure such as a earlier flat structure. It is easier to transform the already developed hierarchical model in to a bipartite, flat model which includes the classes and flat relations. The flat relationsare more preferable for thedesigning level for facing lesscomplexity in the implementation phase. There is nouniqueness and functionality associated with a flat relation. A flat relation is related to the concept of entity relationship modeling and object oriented methods.

II. PROPOSED WORK

To develop an application for identifying the plant species on android platform. Contour based edge detection is used for detecting the edges of the leaf from a plain white background, centroid classification is also done. The feature vector should be distinguishable and irrespective to anykind of scaling,translation orrotation of the contour. The Fourier descriptors are used to make a comparison between the object contours and object silhouettes, but rather we use the Maximally StableExternal Regions (MSER) detector and FD's are used to represent the external contour.

III. LITERATURE SURVEY

For identification and detection of infected leaf using image processing. The detail study about diseases, causes and techniques used to identify and detect them. Proposed work has greater social impact by helping farmers to identify the leaf diseases at early stage and there by increasing yield. Then segment the image and matching that image in database and whether the match is found or not. Reliable detection of diseases in early stages is essential for economic, production and agricultural benefits. Contour based edge detection is used for detecting the edges of the leaf from a plain white background, centroid classification is also done.

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contour algorithm is to identify and detect the plant leaf disease and gives optimal solution. Pre-process the image using various techniques like image resize, filtering, segmentation, morphological operations etc. feature extracted by color, shape, texture. Genetic algorithms can provide a number of potential solutions to a given problem. The final choice is left to the user. Disease feature is extracted. Then, extracted features are involved to recognize the leaf diseases. From the Experimental results the proposed approach is effective one. The proposed method can recognize and classify the leaf diseases with high recognition rate

IV. A TECHNOLOGIES USED IN ANDROID

Android is more a software stack rather than an operating system for mobile devices, the software stack Constitute of a middle ware, OS and applications key applications. The Android SDK provides the APIs and tools necessary to initiate the Developing the applications on android using java. Features of AndroidApplication framework enabling reuse and replacement of components .dalvik virtual machine optimized for mobile devices integrated browser based on the open source web kit engine optimized graphics powered by a custom 2d graphics library; 3d graphics based on the opengles 1.0 specification (hardware acceleration optional.).sqlite for structured data storage. media support for common audio, video, and still image formats (mpeg4, h.264, mp3, aac, amr, jpg, png, gif). gsm telephony (hardware dependent). Bluetooth, edge,3g, and wifi (hardware dependent).camera, gps, compass, and accelerometer (hardware dependent).

Today, Android has become the most popular mobile Operating System. Android is the leader in smart phone market in the world. Customers select mobile phones with the Android operating system as their best choice. Meantime, the programmers throw themselves into the Android application development camp.

A. Linux Kernel

The bottom layer is Linux Kernel. The Linux Kernal provides a basic system functionality, which are memory management, device management etc. It also handles the things that Linux is good at such as networking.

B. Libraries

On top of the Linux Kernel there is a set of libraries that include open-source Web browser engine WebKit, SQLite database, libraries to play and record audio and video, SSL libraries and so on.

C. Android Runtime

The Android Runtime provides a key component called Dalvik Virtual Machine that is a kind of Java Virtual Machine designed for Android. It also provides a set of core libraries: it allow the developers to develop Android applications using the standard Java programming language.

D. Application Framework

This layer provides many higher-level services to application in the form of Java classes. Application developers were permitted to make use of these services in their applications.

V. DESIGNING USER INTERFACE

User Interface of the application is designed to be simpleand easy to use. The interface was designed in android visual studio IDEsuch that it fills the screen of any android device in which it isused.

VI. AUTO-RECOGNITION MODE

It is highly impossible for any botanist to identify morethan a very little of the total number of thenamed plantspecies, which makes him difficult to proceed further on hisresearch over plants. Segmentation is used for partitioning adigital image or assigning a label to all the pixels in an imagein to multiple numbers of segments. The ultimate aim ofsegmentation is to make the representation of an imagesimpler to understand and analyze. And it is used to identifythe objects and boundaries in images. In other words thesegmentation is the process of assigning a label to everypixel in an image and since the pixels with same label sharesome of the visual characteristics. Separating the greencolored leaves from an overall floral environment seems tobe a much tougher issue, and there are also algorithms toovercome such difficulties causing by the naturalbackground. Tengkuo and chen used 3D point reconstructionfrom a various number of images to perform a 2D/3D jointsegmentation by using the 3D distance and the color similarityand Wang proposed and implemented an automatic markerwatershed segmentation. After a threshold erosion process. Allthe above explained methods are very complex and it seems tobe unreachable for a simple mobile application. Consider aweed leaf, it has a complex structure even though good resultshave been obtained with a minor overlaps. Mei-yanjin et al presented a method of recognition that generates vertical andhorizontal lines, therefore the objects passing through theimages selects four certain points in the boundary such thatvertical and horizontal lines meet the background of the objects.Boundary surfaces are continually observed and monitoredfrom each of the four points for the detection.

VII. SYSTEM DESIGN

The following are the modules which are being used in the design of the system they are given as 1.Designing User Interface 2.Leaf Identification 3.Contour edge detection 4.Scale Invariance Feature Transform 5.Contour comparison 6.Plant species Recognition. The architecture diagram is given below.

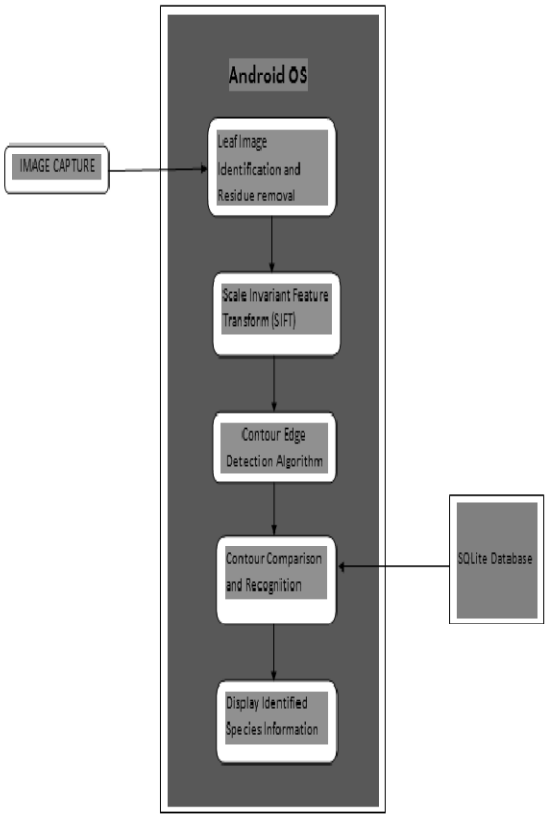

FIGURE 1.System Architecture Diagram

VIII. LEAF IDENTIFICATION

Leaf Identification was implemented in Javascript of the android application. The major function of this application is to identify the disease in the leaf from the captured camera image. For easy identification 'Mark Head' and 'Mark Tail' of the leaf is provided. Leaf and Non-Leaf classification is done. Untrained users initially try to take photos of leaves insitu with multiple leaves present amid clutter, often with severe lighting and blur artifacts, resulting in images that we cannot handle (usually due to segmentation failures). We address these issues by first running a binary leaf/non-leaf classifier on all input images. If it detects that an input image is not reasonable - leaf placed on a light untextured background with no other clutter - we inform the user of this fact and instruct them on how to take an appropriate image. We found this simple Procedure very helpful for training users without the need forlong tutorials or help pages, which often go unread. It alsogreatly reduces the computational load on our server, asimages that fail this classification (about 37.1%) are discardedfrom further processing.

XI. CONTOUR EDGE DETECTION

Contour edge detection is performed to find the leafContour for skimming the features that are necessary to identify and analyze the plant species. The modified canny edgedetection is used in this phase of the system. And these edge points of the four leaves will be taken as the starting and the terminating points of the tracing algorithm. After determining those four edge points, the rest of the contour is automatically traced by our application, we have constructed the cost function of IS that utilizes the operations of a color edge cost terms andcanny edge cost terms. Every one of the four sets of edgepoints, (p1 p2),(p2 p3),(p3 p4) and (p4 p1) is served as thestarting and terminating trace points. And after that we have selected the minimum point with the shortest path cost to monitor the route. The major work of the IS algorithm is the construction of the cost function. In a neutral case, the system should contain all the image that will have an impact on the position of the contour. Rather than the traditional IS algorithm to construct the cost functions we are using the canny edge cost terms and gradient magnitude terms, since the edges of the petals having a sharp direction in our application.

X. PLANT SPECIES RECOGNITION

In plant species recognition, matching of the extracted value is done. For auto recognition method, error constant is introduced so that the value varies from the range of acceptable values whereas in manual recognition exact values of all features must be there to recognize the species. Implicit data of a raw image is more useful for the process of shape analysis. Detecting the plant species Elliptic Fourier Descriptors, Contour Signatures, Landmarks And Linear Measurements, Shape Features ,Polygon Fitting and Fractal Dimensions can be used. Any system that is concerned with distinguishing between different groups
of plants must be aware of the large intra-class, and small inter-class variation that is typical of botanical samples . A number of classifiers have been developed that identify the species of a specimen from a digital image and these must be robust to this challenge. Distinguishing between a large number of groups is inherently more complex than distinguishing between just a few, and typically requires far more data o achieve satisfactory performance. Even if a study is restricted to a single

SAMPLE OUTPUT

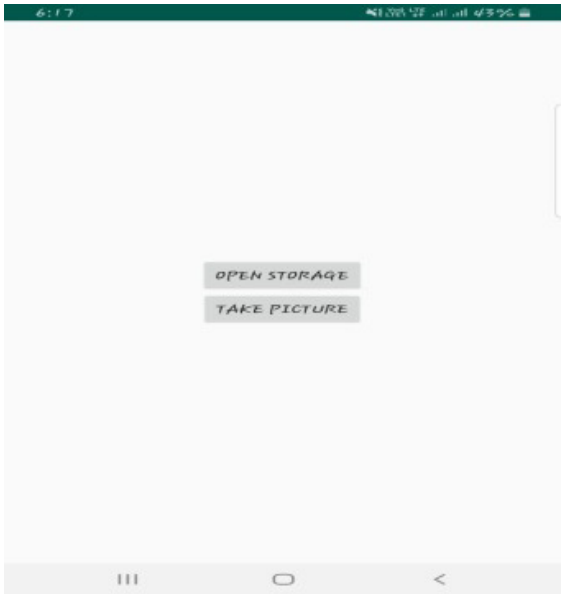

FIGURE 2. User page template shows to open storage or to take picture using the mobile camera

FIGURE 3. Sample source image for detecting the edge of the plant leaf using contour algorithm

FIGURE 4. This image shows the masking where some of the pixel intensity value are zero and others are non zero .

FIGURE 5. Resultant image shows the leaf damaged by 10%

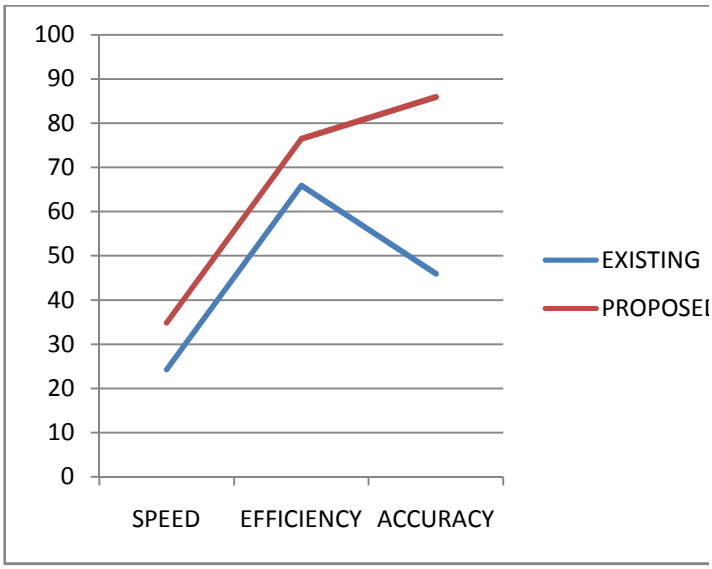

FIGURE 6: This Graph illuminates the existing and the proposed system.

XI.CONCLUSION

It is investigated in various methods for recognizing plant species and analyzed the importance of such an application to the taxonomists and botanists. Here the plant species recognition technique that is scale invariant, contour based, fast and efficient. The application based on the underlying algorithms for several key aspects, including classifying images as leaves or not, obtaining leaf contour, extracting key features of the leaf, comparing it with the dataset and displaying the matching species. A high level engagement in this application may permit for many possible future directions. The application can be improve the accuracy and speed. The dataset can be provided through a spatial database for easy access and substantially decrease the application size. Finally, It includes adding all collaborative features in the application. It is believed that the area of the project has greater scope and further study is necessary to put computer vision systems to efficient use for the betterment of the society.

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