Leaf Classification based on Color Moment

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Abstract- The goal of this paper is to implement a leaf classification technique using an image processing algorithm for efficient feature extraction. Morphological features like color moment features are used in this paper. Like many other methodologies different leaf images may have similar or identical color and shape values. Hence, in this paper we are using KNN (K-Nearest Neighbor) classifier to classify the leaf. Classification is a process in which individual items (objects or patterns or image regions or pixels) are grouped based on the similarity between the item and the description of the group. Classification includes a broad range of decision-theoretic approaches to the identification of images. All classification algorithms are based on the assumption that the image in question depicts one or more features (*example*, geometric parts in the case of a manufacturing classification system, or spectral regions in the case of remote sensing, as shown in the examples below) and that each of these features belongs to one of several distinct and exclusive classes. The classes may be specified *a priori* by an analyst (as in *supervised classification*) or automatically clustered (*i.e.* as in *unsupervised classification*) into sets of prototype classes, where the analyst merely specifies the number of desired categories.

Keywords- Color Moment, Classification, Segmentation, leaves.

I. INTRODUCTION

In image processing, image analysis and machine vision have been sharply developed, and they have become a very important part of artificial intelligence and the interface between human and machine grounded theory and applied technology. These technologies have been applied widely in industry and medicine, but rarely in related to agriculture or natural habitats. India is an agriculture country where in about 70% of population depends on agriculture. Leaf play an important role in the life of human beings. They are useful for human as well as animals too. Plants also useful for providing food, medicine, oxygen and much more. The leaf area monitoring is an important tool in studying physiological features related to the plant growth, photosynthetic & transpiration process.

There are many challenges for researchers to try other approaches for better performance in order of feature extraction. A particular method may produce accurate result in specific samples of leaves, but does not guarantee to perform good result for other ones. In order to recognize plant species there have been many recent studies on plant identification. One way to recognize the plant is from their leaves because every plant has a unique leaf. It serves as a tool to plant biologists and botanists for distinguishing plant species. A leaf is an organ of vascular plant and is the principal lateral appendage of the stem. Each leaf has set of features that differentiate it from the other leaves, such as margin and shape. In nature, plant leaves are two dimensional containing important features that can be useful for classification of various plant species, such as shapes, colors, textures and structures of their leaf, bark, flower, seedling and morph.

The most frequently referred visual contents for image retrieval are color, texture, shape, features. In our proposed methodology, we will discuss about color moment. Color moments are measures that can be used differentiate images based on their features of color. Once calculated, these moments provide a measurement for color similarity between images. These values of similarity can then be compared to the values of images indexed in a database for tasks like image retrieval. The Color moment method has the lowest feature vector dimension and lower computational complexity. Hence it can be considered as suitable parameter to generate feature vectors which can be further used for classification purpose or for image retrieval.

II. FORMULATION

Leaf classification based on color moment is found to be more effective technique because of the properties of leaf images are unique and separated the each colors individual and extracted the each colors component values. Its accurate and robust classification has been great works for the researchers. There are several methods in the proposed literature survey for color methods, but there is few work is done on the color moment. Most of the research papers consider only RGB and HSV color models, but in our works we consider RGB, HSI, CMY, YIQ color models.

III. LITERATURE SURVEY

Based on our knowledge the several researchers as follows in below,

According to Raj Kumaret.al[2]proposed an approach for leaf detection under varying color moment. In their approach firstly they takes the input image which is in the form of RGB color space and converts it to the HSV color space. In their proposed method they use RGB color space for color moment. Proposed method is achieved by

extracting features from the images which can be further used with classification algorithms or content based image retrieval systems. The method gives the result by extract the features of color images of 1st,2nd,3rd moment of color.

According to the ideas of Annesha Malakar et.al [5] they propose a new Multi Feature image Clustering technique which will help us to classify the large Volume data with high Accuracy level. The features of multi class are color moments, color his to gram and canny edge detection technique. First extract the color moments feature from an image, and then consider histogram analysis and make a summation of each color bin. Finally they used canny edge detection technique. Lastly combine all features in a matrix and perform clustering algorithm to cluster data.

According to V. R. Patil et.al [3] the proposed technique aims to extracts relevant Information from another sensor in order to best complete the object segmentation. First, a contour-based feature representation is presented that implicitly captures object shape. The notion of relevance across sensor modalities is then defined using mutual information computed based on the affinity between contour features. Finally a heuristic selection scheme is proposed to identify the set of contour features having the highest mutual information with the input object regions.

IV. MOTIVATION

From the literature review, we noticed that the most existing systems methods in RGB color space, HSV color space and rarely on YIQ color space and CMY color Space and they use leaf images for detections of the disease part. In our proposed Methodology we extract the each components color values and KNN method used for classification and we have taken the dataset from the standard flavor leaf images.

V. CHALLENGES

The following are the summary of the main delimitation in color moment of leaf:

1. Different lighting and the quality of camera directly affect the quality of the leaf.
2. Leaf detection system can not only detect leaf on simple environment. In reality, people are always located on complex background with different texture and object.
3. Leaf images directly vary for different rotation about the camera's optical axis. Image orientation directly affects the angle of the leaf.
4. This problem includes factors such as intensity, resolution, camera lighting, background, characteristics of image capturing device and distance between camera and images of leaf, plays an important role in the process of leaf classification.

VI. APPLICATIONS

1. Species population tracking and preservation.
2. Plants based medical research.
3. Crop and food supply management.

VII. PROPOSED METHODOLOGY

In this project we proposed a new methodology for leaf classification based on color moment. The original images are in the different in sizes and shape so we resize all the images to standard 256*256size. The images obtained after applying color moment information is given to binarisation i.e., it is transformed and RGB image to gray scale image and then convert to binary image. Extract the each individual colors component values first and also extract the features of color moment. Color moments measures that can be used differentiate images based on their features of color.

VIII. ACCOMPLISHMENT

To accomplish our problem statement and objectives we need a collection of different images of leaf which are collected from the standard flavia dataset. The collected images are in the form of RGB images. Convert RGB images to Gray scale image, gray image is an image which the value of the each pixel is a single samples, it carries only intensity information. After that convert to binary image and extract the features of color moment. And apply KNN method for classification of leaf.

IX. EXPERIMENTAL RESULTS AND OBSERVATIONS

We have collected totally 500 images of leaf. The dataset contains 10 classes; each class contains 50 images of same species of leaf in different shapes. We have taken the images from the standard flavia dataset. Samples images

Fig.1: Sample dataset

	1	2	3	4	5
1	182.7377	211.5033	169.3288	182.7377	211.5033
2	212.8449	222.3792	203.1523	212.8449	222.3792
3	202.3607	216.8189	187.9748	202.3607	216.8189
4	191.3980	212.5340	162.5628	191.3980	212.5340
5	210.8274	228.0920	199.7136	210.8274	228.0920
6	206.2785	226.6297	190.6011	206.2785	226.6297
7	205.1631	218.3204	192.3979	205.1631	218.3204
8	212.3140	233.2398	151.7786	212.3140	233.2398
9	161.0514	192.0230	133.8268	161.0514	192.0230
10	209.5091	225.7655	185.6596	209.5091	225.7655

Fig.2: Color feature extraction values

	1	2	3	4	5	6	7
1	1						
2	1						
3	1						
4	1						
5	1						
6	1						
7	1						
8	1						
9	1						
10	1						
11	1						
12	1						
13	1						
14	1						
15	1						

Fig.3: Labeling the images

X. CONCLUSION

In this work aims to develop a quick, automatic and accurate system for the leaf classification. Extracting features of leaf based on color moment and apply the K-Nearest Neighbor method for classification. First the images are transformed into grayscale and normalize. And extract the component value of the each color models. The features obtained from the color moments can be further used for indexing images based on color. Color moment that consists of Mean, Standard deviation, Skewness and Entropy.

XI. REFERENCES

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XII. FUTURE ENHANCEMENT

The project has a scope in future. Here we use the feature extraction based on color moment and KNN method for classification. For future work we extract the features based on shape, texture methods. And also use ANN(artificial neural network),SVM(support vector machine) methods for the classification and also apply a feature level fusion technique to improve the performance of the work.