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Identification and Classification of Flowers Images using Colour models

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Abstract*— Image processing plays a vital role in extracting useful information from images. In computer aided plant identification and classification system the image processing will take a crucial role for the flower classification. The content image based on the low-level features such as colour and textures are used to flower image classification. In this paper the edge and colour characteristics are used to classify flowers images. The features are computed edge characteristics like Red, green, blue, hue, and saturation characteristics are derived from histograms. The query image is considered and its features are being computed and compared with the features stored in database of the trained images. The output images of the flowers with similar features are being displayed. The work has been analysed and the results reported in this are found to be satisfactory and more competitive.

***Keywords*— Flower segmentation, Flower classification, Colour features, colour modules**

I. INTRODUCTION

There are many flower varieties in the world. Some varieties have many colours, such as roses. It is hard to remember all flower names and their information. Furthermore, someone may be confused with similar flower species. For example, white Champak and Champak have similar names and petal shapes but they have different colours and petal lengths. At this time it is almost impossible to identify particular flowers or flower species in any other way. But to seek information based on personal knowledge and experience of experts may be a barrier to such information seeking and the searching for on the Internet. Today it's very much restricted to key word searching; text processing. Even in this the searcher needs to provide sufficient useful keywords, which they cannot do, which is the crux of the matter. Another approach to flower and plant recognition and identification; one based on image processing. Using image processing methods, people who want to know flower and species information could do so by taking photos, probably using a smart phone, but also a digital camera, or using a photo from the Internet. These photos can then be input into the image processing system proposed here and identified by the system. Developing of an automated a system for flowers classification is a complex task; because of extensive similarities among different classes. Due to the enormous confusion in and across the various classes the flower classification makes a more challenging. The applications of automatic classification of flowers can be found useful in floriculture, flower searching for patent analysis etc. The floriculture has become one of the important commercial trades in agriculture owing to steady increase in demand of flowers. In such cases automation of flower classification is very essential further, flower recognition is used for searching patent flower images to know whether the flower image applied for patent is already present in the patent image database or not. Since these activities are being done manually and it is mainly labour dependent and hence automation is necessary [1][2].

In this paper the flower identification and recognition system based on image processing has been developed. Hu's seven-moment algorithm is applied to acquire edge characteristics and red, green, blue, hue, and saturation characteristics are derived from histograms. The query image is considered and its features are being calculated and compared with the features stored in database of the trained images.

II. RELATED WORK

In [1], authors have proposed an algorithm to index the patent images using the domain knowledge. The flower was segmented using iterative segmentation algorithm with the domain knowledge driven feedback. In their work the image colour is mapped to names using ISCC-NBS colour system and X Window system. Each flower image is discredited in HSV colour space and each point on the discretized HSV space is mapped to a colour name in ISCC-NBS and X Window system in order to index the flowers.

In [2], authors have proposed an automatic method for recognizing wild flowers using a frontal flower image and a leaf image. These images were taken by a digital camera. In their work 17 features were computed to describe the colour and shape properties of the flower and the leaf images. Neural networks are used to classify the images. A recognition rate of 95% was obtained for the recognition of 20 sets of flower and leaf images from 16 species.

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In [3], authors have proposed a two step model to segment the flowers in colour images. One models is to separate foreground and background and another model to extract the petal structure of the flower. This segmentation algorithm is liberal to changes in viewpoint and petal deformation. And this method is suitable for any classes of flowers.

In[4], authors have developed a visual vocabulary that explicitly describes the various characteristics (colour, shape, and texture) of flowers. In their work they carried out the experiments on a dataset of 1360 images from 17 flower species. And have shown that the combined vocabulary outperforms each of the individual ones.

In [5], authors have carried out research on flower classification and they considered a dataset of 103 classes, each containing 40 to 250 samples images. They have extracted the low-level features such as colour, histogram of gradient orientations, and SIFT. A Support Vector Machines classifier is used to classify the flower images and they have achieved an accuracy of 72.8% using multiple kernels.

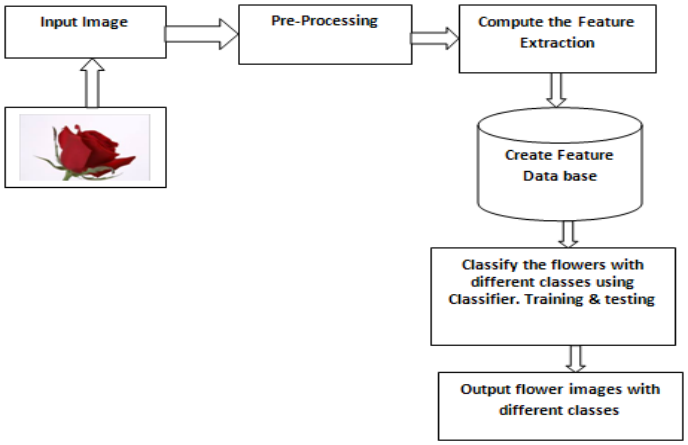
In[6], authors have proposed an model for automatic classification of flowers using KNN classifier. Gray level co-occurrence matrix and Gabor responses features are computed for classification. The experimental Results are presented on a dataset of 1250 images consisting of 25 flower species. It is shown that relatively a good performance can be achieved, using KNN classifier algorithm.

In[7], authors have proposed a method for flower classification using neural network classifier for flower classification. The features were computed using DWT and GLCM. The neural network is trained using the back propagation algorithm. In their work they worked on their own database of flowers of 5 classes, each containing 10 flower images. It has been presented that MLP offers accuracy 87% with GLCM features.

In[8], authors have introduced a strategy for comparing feature histograms for fine-grained classification, a robust shape descriptor and a metric learning approach that employs different weights to each feature, that can improve classification accuracy significantly. The algorithm is extremely fast, being suitable for offline mobile applications and was able to outperform previous works using the popular Oxford Dataset.

In[9], have proposed method for classification of flower images by means of Gist descriptor and statistical features using SVM classifier. In their experimental work they considered 102 categories of flower dataset of Visual Geometry Group, university of Oxford. The Gist descriptor is combined with statistical features such as mean, standard deviation, skewness, kurtosis is given to SVM classifier. It uses multiple kernel frame work to classify the images and they achieved a recognition rate is 79.36%.

III. PROPOSED METHODOLOGY FOR FLOWER CLASSIFICATION SYSTEM



3.1 Flower image acquisition:

In Image acquisition, the recognition system acquires a scanned image as an input image. The image should have a specific format such as JPEG, BMT, *etc.* The image may be acquired through a scanner, digital camera or any other suitable digital input device.

3.1.1 Data Set used in this work

Due to the enormous changes in inter and intra classes of the flower images we have created our own dataset. Some flower images are taken from the web and some images from the digital and mobile camera which are found in and around our place with different light intensities and with different illumination. The dataset consists of 05 species of flowers with 10 images of each. The images are rescaled to the size 200X200. The below figure shows a sample image of each 5 classes; figure 3.1 presents few samples of randomly selected flower classes.

Figure 3.1: Sample of Flower Images

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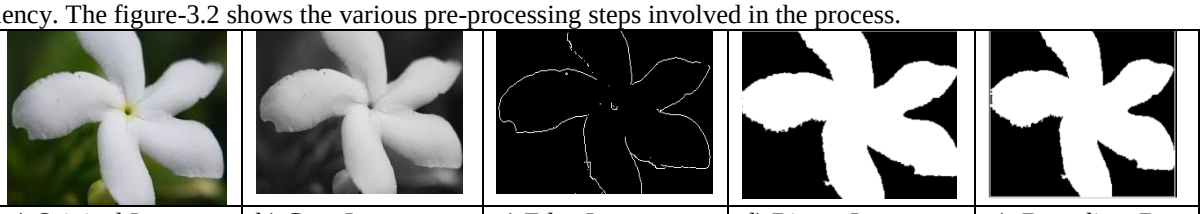
3.2. Pre-processing:

After acquiring the images, the initial task is to do pre-processing and these techniques are application dependent. In our case we are pre-processed the flower images such noise removal background elimination, cropping, converting colour image into gray and binary image etc., finding the edge image, finding the bounding box to increase the computer efficiency. The figure-3.2 shows the various pre-processing steps involved in the process.



a) Original Image	b) Gray Image	c) Edge Image	d) Binary Image	e) Bounding Box image

Figure-3.2 shows the various pre-processing steps involved in the process.

3.3 Feature Extraction:

The next step of the hand image reorganization system will perform the feature extraction takes to compute the hand size values, colour, textual feature, thus, the area, perimeter, mean value, median value, and standard deviation value of the hand. The flower classification is depended on its feature like morphology, colour and texture.

3.3.1 Morphological features:

The morphological features like Area, Bounding Box, Perimeter, Centroid , Convex Hull, Convex Image, Convex Area, EquivDiameter, Euler Number, Extent, Extreme, Filled Area Image, Major Axis Length , Minor Axis Length, PixelIdxList and Pixel List are computed for extraction of features.

3.3.2 RGB Values

By this the values of Red, Green and Blue colour was found by using histogram and computed the Aspect Ratio and Bounding Box

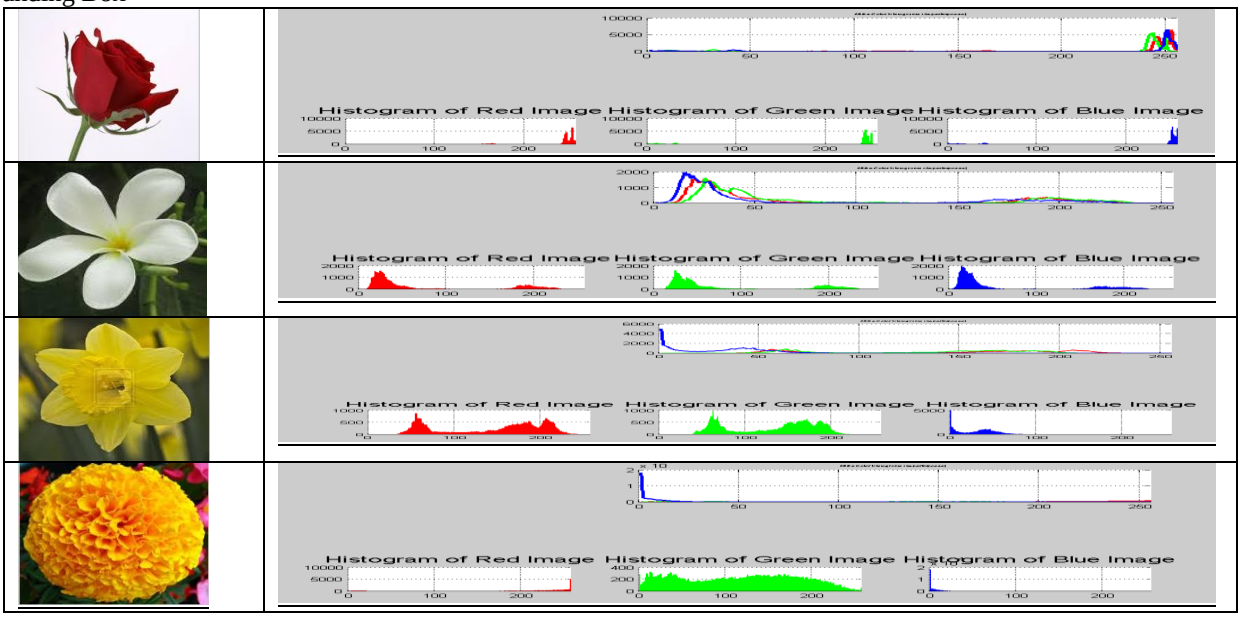


Figure 3.3.2: Histogram for each flower

3.3.3. Texture Values:

Texture values are also computed to extract the features and they are Median value, Mean value and Standard deviation.

IV. EXPERIMENT ANALYSIS AND RESULTS DISCUSSION

The experiment is conducted on 5 different classes of flowers each class is of samples. These samples were created with different light intensities, with different illumination using digital and mobile cameras. The RGB and CMY color models are used to compute the features. The following is general algorithm for computing the features.

Input: Flower color image.
Output: Classification of different class of flower images.
Step-1: Pre-processing i.e. removal noise, images resize, etc and Convert it into grayscale.
Step-2: Normalize gray scale image to size 200x200 and define the co-occurrence matrix.
Step-3: From the co-occurrence matrix compute the morphological, RGB and CMY color model features
Step-4: Classify the flowers on the basis of RGB, CMY values and aspect ratio
End of the algorithm.

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For each class of flower image the RGB values and CMY values with aspect ratio is predicted. For RGB color model the Maximum and minimum values for Red, Green, and Blue were computed. By using these maximum, minimum and average values of RGB the type of flower is identified and classified accordingly the results are predicted in Table-1. Also for CMY color model the Maximum and minimum values for CMY values were computed and using these maximum, minimum and average values of CMY the type of flower is identified and classified accordingly and the results are predicted in Table-2.

TABLE-1: RGB VALUES FOR EACH FLOWER WITH GRAY-SCALE IMAGE AND EDGE IMAGE

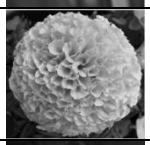
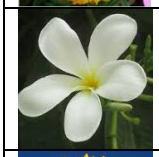
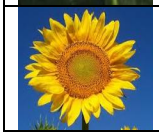
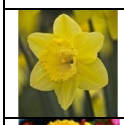
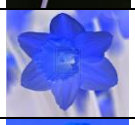
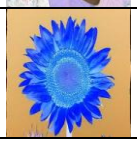
Input Image	**Gray Scale Image**	**RED**		**BLUE**		**GREEN**		**Aspect Ratio**
		Max	Avg	Max	Avg	Max	Avg	
		6528	196.27	6669	183.64	5655	192.20	1.5569
		868	196	4983	196	956	196.78	1.3983
		5161	197.71	18244	196.32	327	198.22	1.1756
		1570	196.27	1984	193.8	1607	196.27	1.2070
		1987	196.75	4963	192.56	1458	195.67	1.0070

TABLE 9.2: CMY VALUES FOR EACH FLOWER

Input Image	CMY Image	Cyan		Magenta		Yellow		Aspect Ratio
		Max	Avg	Max	Avg	Max	Avg	
		886	196.31	721	196.03	1060	195.33	1.3567
		868	196	956	188.22	4983	195.38	1.1070
		9093	197.75	6297	180.12	19038	196.21	1.0868
		886	196.273	721	186.87	1060	190.02	1.0731
		1987	196.75	1458	187.45	4963	192.78	1.3315

V. CONCLUSION

In this experiment the RGB and CMY colour models are used to compute the features. The RGB values for different flowers are predicted in table-1. For each colour we had considered the maximum and average values for red, blue and green colours. Therefore, there exist the different average values and maximum colours value for different flowers. From table-2 we can know the CMY values for different flowers. For each colour we had considered the maximum and

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average values for cyan, magenta and yellow colors. Therefore, there exist the different average values and maximum colors value for different flowers. This work may be extended for extraction features using different methods to build a robust method for classification.

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