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Literature Review on Flower Classification

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***Abstract*-Many models are developed to extract flower features and identify its type or signature, various classification algorithms are used to check the accuracy of classification. There is large number of flowers available in the world and it is hard to remember all names of flowers so the system which is developed for identification of flower type is useful. In this paper we have present literature survey of various techniques used for flower classification.**

Keywords-Feature extraction, color feature, shape feature, texture feature, classification, neural network, svm, kNN, Hu's seven moment, GLCM.

I INTRODUCTION

Now a day's it is very important to identify naturally occurring objects and recognise its type. It is useful to identify flower type in various fields such as Gardening, botany research, Ayurvadic treatment, Farming, floriculture etc. Our literature survey have to found that the different Image processing techniques used to extract features from flower and classify them using computational intelligence algorithms.

Digital image processing deals with manipulation of digital images through a digital computer. It is focuses on developing a computer system that is able to perform processing on an image[1]. Digital image processing technologies such as Classification, Feature extraction, Pattern recognition etc are useful to classify the images.

II CLASSIFICATION ALGORITHMS

Classification techniques are widely used to classify data among various classes. Classification techniques are being used in different system to easily identify the type and group to which it is belongs to. There are many algorithm used for classification. There is mainly two types of classification algorithms Supervised classification algorithms and Unsupervised classification algorithms.

Supervised classification algorithms[3]:

- Artificial Neural Networks
- Learning vector Quantization
- Decision tree induction
- Nearest neighbour classifier
- Bayesian classifier
- Support vector machine
- Regression trees etc.

Unsupervised classification algorithms[3]:

- Expectation-maximization algorithm
- Vector Quantization
- Generative topographic map
- Information bottleneck method
- K-means
- Fuzzy clustering etc.

In Supervised learning the computer is presented with example inputs and their desired outputs, given by a "teacher", and the goal is to learn a general rule that maps inputs to outputs [2]. While in Unsupervised learning, no labels are given to the learning algorithm, leaving it on its own to find structure in its input. Unsupervised learning can be a goal in itself (discovering hidden patterns in data) or a means towards an end[2].

III LITERATURE REVIEW

Here we have presented the review of our working related area of flower classification and also present the methods used for to classify the flower images.

1.Fadzilah Siraj, Muhammad Ashraq Salahuddin and Shahrul Azmi Mohd Yusof proposed the system for classification of Malaysian blooming flower[4]. In this paper they presents the application of NN and on image processing particularly for understanding flower image features. For predictive analysis, they have used two techniques namely, Neural Network (NN) and Logistic regression. The study shows that NN obtains the higher percentage of accuracy among two techniques. The Otsu's method was applied in order to compute a global threshold.The image is then converted to RGB color space again. In color extraction, the images were transformed from RGB color space to HSV color space the image texture is calculated based on gray-level co-occurrence matrix (GLCM) to obtain the contrast, correlation, energy and homogeneity of the image.The prediction accuracy of logistic regression is 26.8%. Therefore based on 1800 samples of Malaysian flower images, NN has shown a higher average prediction results vs. logistic regression.

However this paper cannot present recognition of flower type, its only recognize flower features so in future studies can be focused on developed flower model system which can recognize Malaysian blooming flower or extending the dataset built and Verities sample of images can be captured for different flowers and recognize their types.

2. Pavan Kumar Mishral, Sanjay Kumar Maurya, Ravindra Kumar Singh and Arun Kumar Misral present a semi automatic plant identification based on digital leaf and flower images[5]. They proposed an algorithm for identification using multiclass classification based on color, shape volume and cell feature. Each stage further also divided into three steps. First stage comparison based on extracted features from RGB component. Second stage based on shape feature Area Convexity, Perimeter Convexity, sphericity and Circulatory. And last stage based

on cell and volume fraction feature. Experiment is performed on a sample of diverse collection of 1000 leaf and flower and recognition rate is up to 85% on an average.

In proposed system entire feature cannot be taken at a time because it will take lot of time for computation and space. So multi stage comparisons are used for identification of image.Its multi stage comparison so required more tables to stored results and its long process. They used Unsupervised learning algorithm which has less accuracy as compared to supervised classification algorithm.

3. Tanakorn Tiay, Pipimphorn Benyaphaichit, and Panomkhawn Riyamongkol proposed flower Recognition System Based on Image Processing[6].This system uses edge and color characteristics of flower images to classify flowers. Hu's seven moment algorithm is applied to acquire edge characteristics. Red, green, blue, hue, and saturation characteristics are derived from histograms. K-nearest neighbor is used to classify flowers.The system returns the top three most similar flower images.The Canny edge detection algorithm is applied to the cropped image to receive edge data. The edge data will be the input into Hu's seven-moment algorithm. Classification: All characteristic values will be classified by the K-nearest neighbor algorithm. The three most nearest flower characteristics are selected; the most nearest flower information is displayed.

This system is based on color model so the accuracy is high if their color are distinct. But if colors are same then it may mislead to classify the image. So this system can be further improved to yield more accuracy by combining other features, such as numbers of petals and flower texture. The accuracy of this system is more than 80%.

4.Prof.Suvarna Nandyal, Miss.Supriya Bagewadi proposed Automated Identification of Plant Species from Images of Leaves and Flowers used in the Diagnosis of Arthritis[7].The present work deals with identification and classification of medicinal plants that are used in treatment of rheumatoid.In the present work, plant parts mainly leaves and flower are taken as an object for identification, since these are available for all the time and have some 2D in nature size and shape.The proposed work deals with image processing techniques such as feature extraction and classification. The features namely height, width, margin and texture features are used for extracting leaf shape features. Similarly for flowers, the petal count and colors are extracted in RGB and Ycbcr color space. The obtained features are trained by neural network classifier. The classification results have shown an accuracy of 85% for leaf and 85% for flower.

The present work deals with development of a system where a user in the field can take a picture of unknown plants, leaf and flower and the system to classify the species. In the proposed work, shape and texture features of sample plant images of five classes are used in the rheumatoid are extracted. Further the accuracy can be increased by taking an efficient shape features in frequency domain. The work can be extended by taking more features and other classifier.

5.Yuita Arum Sari and Nanik Suciati proposed Flower Classification using Combined *a* b** Color and Fractal-based Texture Feature[8].This research proposes a new method of flower classification system using combination of color and texture features.The first phase is getting the crown of the flower, which is localized from a flower image by using pillbox filtering and OTSU's thresholding.The color features are extracted by removing L channel in L*a*b* color space, and taking only a* and b* channel, because of ignoring different lighting condition in flower image. The texture features are extracted by Segmentation-based Fractal Texture Analysis (SFTA). Classification is done using kNN classifier.KNN classifier is used to assess similarity among image flowers. Cosine measure outperforms to all distance measures under k = 9.The combined a*b* features and texture gives the better performance when using cosine measure, than using L* color channel when combined with texture feature. The flower classification achieves the best result with accuracy 73.63%.

Comparing the colour feature extraction, the accuracy of texture feature is better to stand alone, and help the performance to achieve the accuracy when all features combined with combined a*b*colour and texture feature. Beside the distance, choosing of k value in kNN method is quite critical. In this paper, the accuracy will be poor if the colour feature extraction independently used for classifying flower. Removing L, give the bad result for colour feature performance when the feature classifies in stand-alone. The proposed model is sufficient to overcome the image flower classification in different lighting condition and color in the same class.

6. M. Z. Rashad1, B.S.el-Desouky2 , and Manal S .Khawasik proposed Plants Images Classification Based on Textural Features using Combined Classifier[9].This paper introduces an approach of plant classification which is based on the characterization of texture properties. They used the combined classifier learning vector quantization. All plant images they use in their system are in 128 × 128 resolution. A learning rate is user-designated in order to determine how much the link weights and node biases can be modified based on the change direction and change rate. The higher the learning rate (max. of 1.0) the faster the network is trained. If no. of epochs increases the accuracy increases. If learning rate increase the more accurate but the more time. It shows that accuracy is 98.7% compared to other systems.

The system has an advantage of its ability of classifying and recognizing the plant from a small part of the leaf without depending neither on the shape of the leaf or on its color features, since the system essentially depends on the textural features. Hence, the system is useful for the botany researchers when he wants to recognize a damaged plant, since this can be carried out depending only on a small part of the damaged plant.

7. Dr.S.M.Mukane, Ms.J.A. Kendule proposed Flower Classification Using Neural Network Based Image Processing[11].In this paper, it is proposed to have a method for classification of flowers using Artificial Neural

Network (ANN) classifier. The proposed method is based on textural features such as Gray level co-occurrence matrix (GLCM) and discrete wavelet transform (DWT).The ANN has been trained by 50 samples to classify 5 classes of flowers and achieved classification accuracy more than 85% using GLCM features only. In this experiment pyramid structured type of DWT is used with dB8 as a wavelet filter. Feature database is created using wavelet decomposed sub bands up to forth level of decomposition. Experimentation has been conducted on databases of 50 images and 5 classes. The classification accuracy under ANN classifier has been investigated. As compared with all classes GLCM features shows highest result while combination of DWT and GLCM shows less success rate. Hence it is found that flower images can be classified easily with the GLCM features only.

Only gray level features have been used. The neural network is trained using the backpropagation algorithm. Own database of flowers of 5 classes, each containing 10 flower images has been created. It has been found that MLP offers accuracy 87% with GLCM features.

8.C. H. Arun, W. R. Sam Emmanuel and D. Christopher Durairaj propose Texture Feature Extraction for Identification of Medicinal Plants and Comparison of Different Classifiers[12].Texture analyses of the leaf images have been done in this work using the feature computation. The features include grey textures, grey tone spatial dependency matrices(GTSDM) and Local Binary Pattern(LBP) operators. For each leaf image, a feature vector is generated from the statistical values. 70% of the images in the dataset are the training dataset and the rest are included in the test set. Six different classifiers are used to classify the plant leaves based on feature values. It is observed that without preprocessing(NP) the best performance obtained is 88.0% with kNN for categories C1 and C2, 94.7% with DT for C3, 94.7% with kNN for C4, 94.7% with SGD for category C5. In this case, the best performance of 94.7% is achieved using the categories C3, C4 and C5. The best classification gives very small error rate for the medicinal plant leaf identification. It is necessary to reduce the error rate for better result. The reduction of error rate may depend on the selected features and the dataset.

The method of classifying without preprocessing performed better. The classification performance of 94.7% is obtained using Stochastic Gradient Descent, Decision Tree and kNN classifiers. Therefore it is concluded that the preprocessing approach is not suitable for the medicinal leaf identification. Instead of using preprocessing, the direct application of feature extraction with different categories produced better performance.

IV CONCLUSION

Flower recognition is useful to identify the flower signature. The methods are used to extract flower features are based on color, shape, petal count and texture etc. In colour based model accuracy is high only if the flower colours are distinct. In shape based model there is problem if the view point of the image is different. Same as in petal count if the some of petals are missing then it may mislead to classify the image. Classifiers plays important role to test the data and check the accuracy of classification algorithm. Supervised classification gives higher accuracy as compared to unsupervised classification algorithms. MLP gives better result as compare to logistic regression, kNN, pNN and SVM.

To identify different flower images based on its surface parameter is challenging and most expensive task. Flower image surface parameters are grain, color and texture. The combined feature extracted from each of its parameter is used to identify flower type and gives better result as compare to using single parameter. Since flower grain analysis plays an important role in flower recognition it is used to identify the flower type. Whereas MLP feed forward method using back propagation algorithm gives higher accuracy to classify the flower images.

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