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Classification using Feature Extraction of Leaf Based on Neural Network Algorithm with K-Nearest Neighbor and Supervised Learning

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***Abstract* - The extraction of features in image processing is a stage taken to determine information from objects contained in the image for the purpose of identifying or providing differences from other objects. Thus the extracted features can be used as parameters in the process to differentiate between objects that bear similarities among them. There are many extraction features used in the image processing process, including: i) extraction of form properties using the eccentricity parameters, ii) determining the size of the extracted feature using some measured parameters such as width and other parameters, iii) extraction of a feature with color. In this study we focus on the process of identification and classification of leaf-based information of the morphological features of the leaf. The imaging process carried out in this study used the K-Nearest Neighbor algorithm to identify leaf-type by using area, perimeter, eccentricity and metrics. The test results showed 97.72% accuracy to distinguish between the types of leaf used in this study.**

Keywords - Extraction of features, objects, information, leaf

I. INTRODUCTION.

The algorithm of K-Nearest Neighbor (K-NN) is a method of classification on a set of data based on pre-classified data learning. Included in supervised learning, where the query results of a new instance are classified based on the majority of proximity distance from the category that is in K-NN. The purpose of this algorithm is to classify the new object with attributes and training samples. Classifications do not use any model to match and are based solely on memory. Given a test point, it will be found a number of K objects (training points) closest to the test point. Classification uses the most votes among the classification of the K object. The K-NN algorithm uses classification classifications as the predictive value of the new test samples. Generally green leaf because it has a green substance or chlorophyll, the green color of the leaf has the main function is as an energy catcher from sunlight for photosynthesis. The morphology of the leaf is the shape or structure of the variations based on their morphology can be distinguished based on the following things are leaf shape, tip, base leaf, leaf bones, meat leaf and leaf surface. Research related to the leaf object has been done, namely to identify or identify the leaf The simplest way is to Look at the leaf based on their leaf, but not many people can distinguish between one leaf and others. This study relates to the classification of leaf based extraction features using the extraction characteristic of the morphological leaf-based algorithm of KNN.

II. LITERATURE RIVIEW

The detailed plant growth identifier around us is very important medically using neural networks (NN) to identify plant species based on their leaf can automatically help communities Non-domain to recognize the plant type based leaf. The methodology used for the experimental identification of leaf based on form is collecting 543 leaf of 20 types of plants, 400 leaf in training and 134 for sample testing with an accuracy of 92%.[1]. This paper proposes a scheme to automatically recognize the plant species based on the image of the leaf and determine the exact class between the three categories, using the space curvature scale (CSS) technique and K-NN classification [2]. This paper has proposed the introduction of systems that are able to identify plants of various types of plants in the natural environment. The dataset used in this paper containing four different types of plants. Modern combination algorithm Description, SURF, FAST-SURF, and HARRIS-SURF. The proposed system to find accuracy is total predictions correctly divided by total predictions and multiplied by 100%. The results of accuracy that can be used by the HARRIS-SURF method is 86.25% SURF is 95%, FAST-SURF is 91.25% [3]. The accuracy of the experiments performed on four leaf datasets indicates that using angles and side lengths is more precise [4]. The number of input nodes of a layer equals the number of features extracted and the number of layer output nodes equals the number of factory categories. The rear propagation algorithm is used to train neural networks and minimize errors between real outputs and expected output by adjusting the connection weight [5]. This paper presents a classification NN Model takes input as a more Holographic feature of Leaf venation and classifies it into four different types. The result of this classification based on Leaf venation obtained 96.53% accuracy in the training model for classification and accuracy of 91% for testing [6]. This paper, are combined to classify the leaf using probabilistic neural. In its implementation, the study used the PFT descriptor of Fourier, three types of geometry features, moment colors,

venous features, texture-based features. The experiment results showed that the method for classification gives an average accuracy of 93.75% when tested on a dataset containing 32 types of plant leaf [7]. The results using learning vector quantization methods provide the best accuracy in classifying the texture of plant leaf, then by combining the techniques of other methods to achieve higher accuracy, the accuracy obtained from the combined results of LVQ and RBF is 98.7%.[8]. PNN was trained by 1,800 leaf classify them into 32 types of plants with the results obtained by the accuracy of 90% [9]. In the paper focusing on research identifying features of shape and texture for leaf of medicine for the introduction of plant species from leaf images using MATLAB. In the process through extracting features from leaf images, then using methods such as threshold and segmentation. The image processing process uses NN artificial neural networks. The implementation of the image is taken using a camera and stored in JPEG format for processing, then the image will be converted from RGB to a gray image, then it will be converted again from gray to binary for filtering [10].

III. EXTRACTION OF LEAF FEATURES

A. Feature Extraction

Features are a unique characteristic of an object. Features can be differentiated into two types, namely "natural" features and "mock" features, where "natural" Feature extraction is a process of reducing dimensionality where the initial set of raw data is reduced to groups that are more easily managed for processing. Feature extraction is a feature form whose value will be analyzed for the next process. Feature extraction aims to find areas of significant and characteristics the image. These areas can be defined in the local or global environment and are distinguished based on their shape, texture, size, intensity, and statistical nature. Feature extraction is done by counting the number of points or pixels encountered in each inspection.

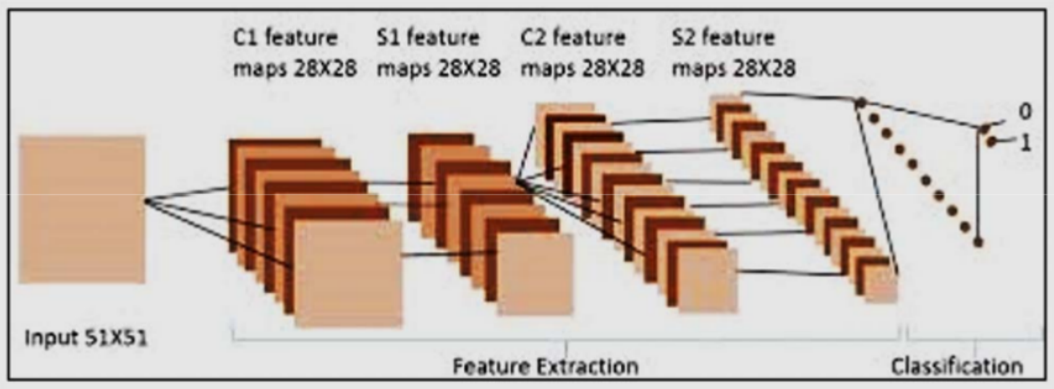

Figure1. Feature extraction

From Figure 1, Feature extraction is a process of capturing the feature of an object that can describe the characteristics of the object. Feature extraction is a process of capturing the feature of an object that can describe the characteristics of the object.

B. Feature Extraction Technique

1. The features that can be extracted from an object in imagery include color, shape, size, and texture. The feature can be used as a parameter to distinguish between objects that are one with another object. To distinguish the shapes of objects one with another object, it can use a parameter called ' eccentricity '.Eccentricity is the value of comparison between distanced of the foci of the minor ellipse with the foci of the major ellipse an object. Eccentricity has a range of values between 0 and 1. The form is one of the characteristics that can be extracted from an object to distinguish it from other objects.
2. To distinguish the size of objects one with other objects can use broad and perimeter parameters. Area is the number of pixels composing an object. Meanwhile, the circumference is the many pixels surrounding an object.
3. Feature geometry is a feature based on the relationship between two dots, lines, or areas in digital imagery. Geometry traits include distance and angle. The distance between two dots (with a pixel unit) can be determined using the Euclidean equation, etc. The distance with the pixel unit can be converted into units of length such as millimeters, centimeters, meters, etc. by dividing it with spatial resolution.

C. Machine Learning

Machine learning is essentially a computer process for learning from data. Without any data, the computer will not be able to learn anything. Therefore if we want to learn machine learning, it will definitely continue to interact with the data. All machine learning knowledge will inevitably involve data. Data could be the same, but its algorithms and approaches are different to getting optimal results. Machine Learning is one of the branches of AI that discusses the development of systems based on data.

D. Leaf: Morphology, Types & Modification

Parts of a Leaf. Generally, leaf base, petiole, and lamina, together form the main parts of a leaf.

Figure 2 shows the structure of a leaf:

- Leaf Base: the most fundamental part of the leaf is the leaf base, which is the leaf part attached to the stem or branch. Leaf base on each part of the leaf differs in many of its characteristics.
- Petiole: is the part of the leaf whose function is to form the connection between the stem or branch with the lamina.
- Lamina: the leaf sheet in which the photosynthesis processes are ongoing.

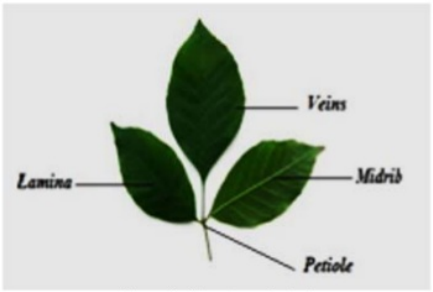

Figure 2. Structure of a leaf

E. Categories of Leaf

Storage Leaf, Leaf Tendrils, Leaf Spines: Some plants have their leaf modified into needle-like structures known as thorns. Leaf Scale is a thin structure, membrane like, without stem and brownish in appearance. They protect the additional buds in their axils.

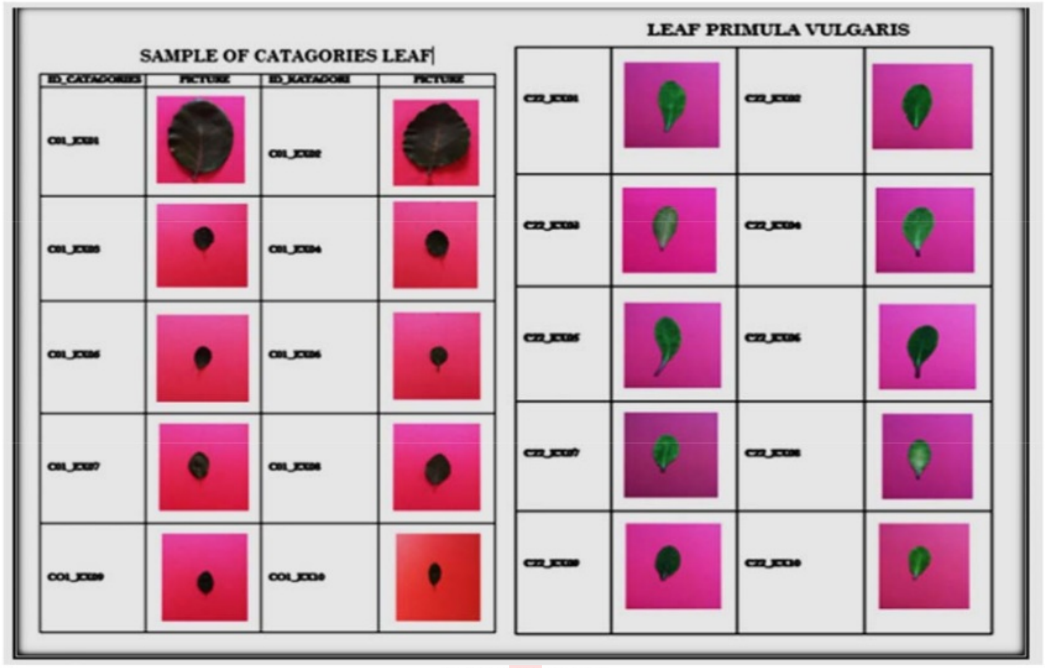

Figure 3. Leaf samples

Figure3 shows leaf samples used for this research with feature extraction technique and image processing for identification and classification.

IV. METHODOLOGY

A. Feature Extraction Techniques in Image Classification

Machine learning is based on properly optimized feature extraction as the key to effective model construction. The methodology for the step to get identification and classification with K-Nearest Neighbor, KNN, can be seen in figure 4.

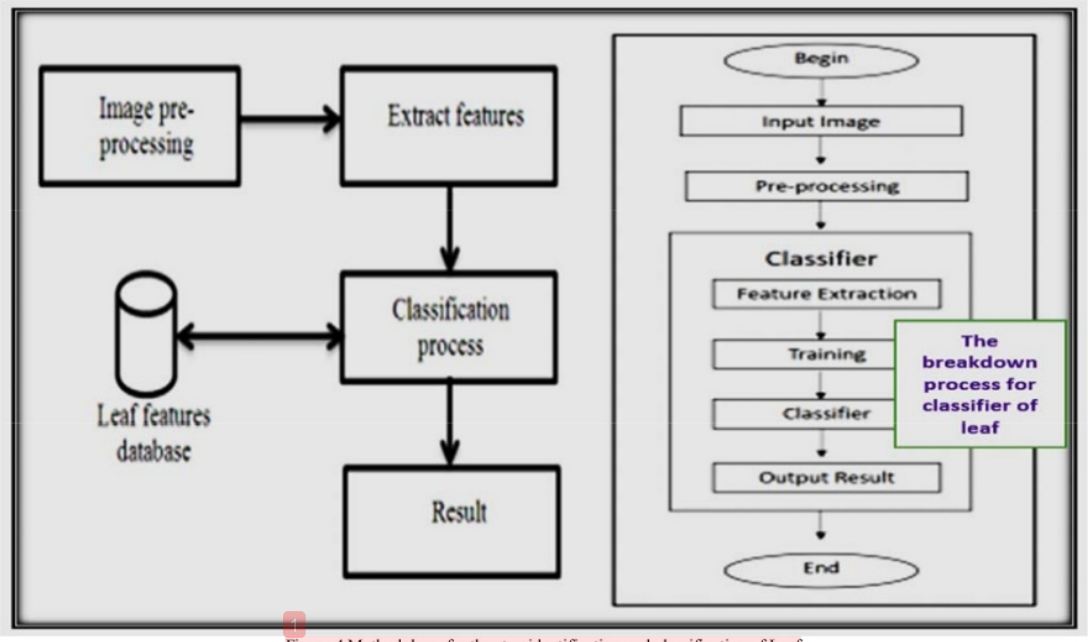

Figure 4 Methodology for the step identification and classification of Leaf

Pattern recognition from leaf usually follows the steps as shown in Figure 4:

a. Image preprocessing
b. Feature extraction
c. Classification process
d. Result

From the process Classifier, the algorithm can be implemented as K-Nearest Neighbors.

B. K-Nearest Neighbors Algorithm

The K-Nearest neighbor algorithm is a method of classifying the object based on the learning data that is closest to the object. Learning data is projected into many dimensional spaces, each of which represents the features of the data.

IV. RESULTS AND DISCUSSION

A. User Interface with the Program

Figure 5 shows the user interface the program for identification and classification leaf, and identification clear with KNN.

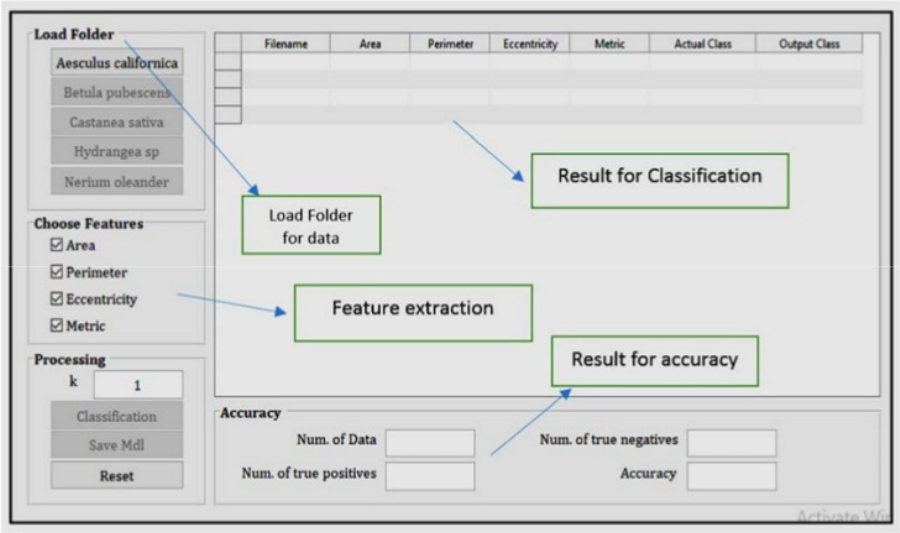

Figure 5. User Interface The program

The training stages are as seen in figure 6.

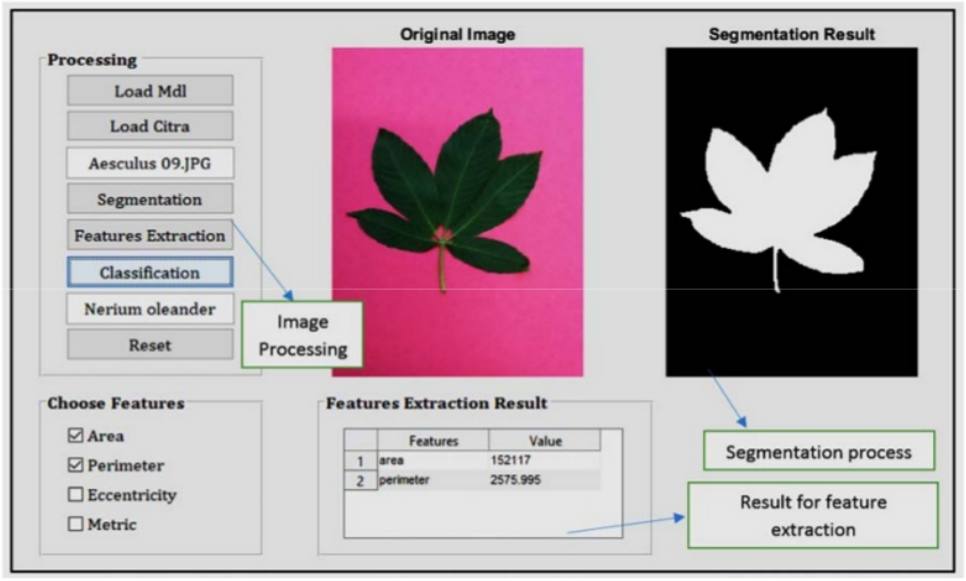

Figure 6. Step by step Feature Extraction

From figure 6:

a. Load Model: can be seen in the model database.
b. Load image: from the database too, for example the select one the leaf 09.jpg.
c. The next step is segmentation.
d. Classification is the next step and we must choose 2 feature for example are and perimeter to get the leaf classification.
e. And the result is the features and value from the table feature extraction result and the classification leaf is get the truth leaf.

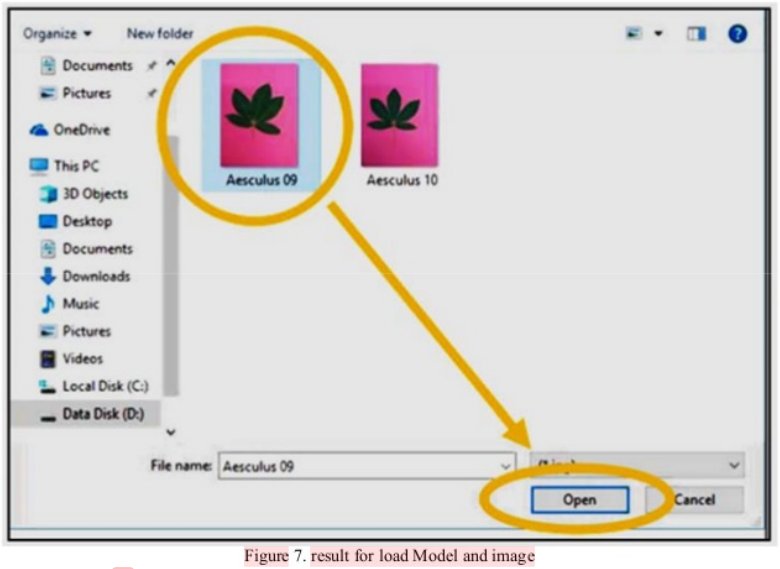

Figure 7. result for load Model and image

Figure 7 shows the results for load model and image to get a leaf. Figure 8 shows the results of image processing with: Load model, load image, segmentation, feature extraction and the next step classification, where the accuracy of the results is around 97.72%.

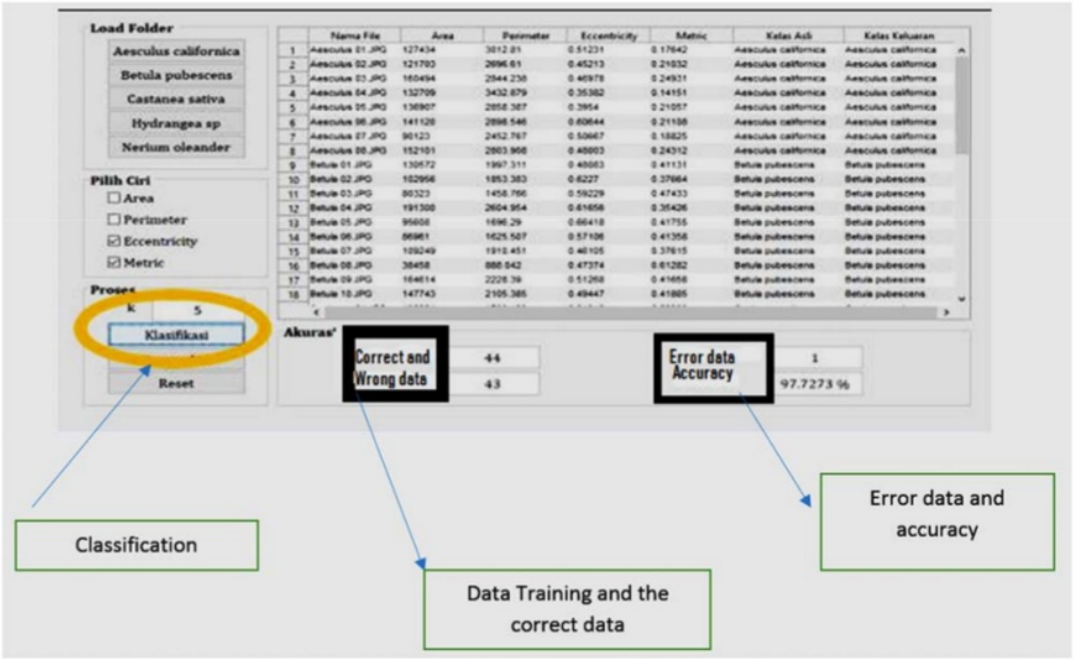

Figure 8. The Accuracy of the results.

V. CONCLUSION

1. The features that can be extracted from an object in an image include color, shape, size, and texture. Each feature can be used as a parameter to distinguish between objects that are one with another object.
2. The process of imaging carried out in this study used the algorithm of K-Nearest Neighbor to determine the identification of these types of leaf by using area, perimeter, eccentricity and metric. The test results showed an accuracy of 97.72%.

REFERENCES

[1] Shayan Hati, Sajeevan G, Plant Recognition from Leaf Image through Artificial Neural Network , 2013, International Journal of Computer Applications (0975 – 8887) Volume 62– No.17, January 2013.

[2] Jyotismita Chaki, Ranjan Parekh, Plant Leaf Recognition using Shape based Features and Neural Network classifiers, (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 2, No. 10, 2011.

[3] Kazerouni, Masoud Fathi, Schlmeper Jens, Khnert Klaus-Dieter, 2017, Automatic Plant Recognition System for Challenging Natural Plant Species, paper proceeding, WSCG 2017.

[4] Sofiene Mouine, Itheri Yahiaoui, Anne Verroust-Blonde, A Shape-based Approach for Leaf Classification using Multi scale Triangular Representation, 2013, ICMR'13,April 16–20, 2013, Dallas, Texas, USA.

[5] Qingfeng Wu, Changle Zhou and Chaonan Wang, Feature Extraction and Automatic Recognition of Plant Leaf Using Artificial Neural Network, 2016.

[6] ManishaAmlekar, Dr. Ramesh R Manza, Dr. Pravin Yannawar and Dr. Ashok T Gaikwad, 2014, Leaf Features Based Plant Classification Using Artificial Neural Network, IBMRD's Journal of Management and Research, Print ISSN: 2277-7830, Online ISSN: 2348-5922.

[7] Abdul Kadir, Lukito Edi Nugroho, Adhi Susanto, Paulus Insap Santosa, 2011, Leaf Classification Using Shape, Color, and Texture Features, International Journal of Computer Trends and Technology- July to Aug Issue 2011.

[8] Vishakha A.Metre, Jayshree Ghorpade, 2013, An Overview of the Research on Texture Based Plant Leaf Classification, IJCSN International Journal of Computer Science and Network, Vol 2, Issue 3, 2013 ISSN (Online): 2277-5420

[9] Stephen Gang Wu , Forrest Sheng Bao , Eric You Xu , Yu-Xuan Wang , Yi-Fan Chang and Qiao-Liang Xiang, 2007, A Leaf Recognition Algorithm for Plant Classification Using Probabilistic Neural Network, arXiv:0707.4289v1 [cs.AI] 29 Jul 2007.

[10] C.Ananthi , Azha.Periasamy , S.Muruganand, 2014, Pattern Recognition Of Medicinal Leaf Using Image Processing Techniques, Vol 2 | Issue 2 | Spring Edition | DOI : February 2014 | Pp 214-218 | ISSN 2279 – 0381.

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