**LITERATURE SURVEY**

**1) Leaf features extraction and recognition approaches to classify plant**

**Author: Ab Jabal, M.F., Hamid, S., Shuib, S., Ahmad**

Plant classification based on leaf identification is becoming a popular trend. Each leaf carries substantial information that can be used to identify and classify the origin or the type of plant. In medical perspective, images have been used by doctors to diagnose diseases and this method has been proven reliable for years. Using the same method as doctors, researchers try to simulate the same principle to recognise a plant using high quality leaf images and complex mathematical formulae for computers to decide the origin and type of plants. The experiments have yielded many success stories in the lab, but some approaches have failed miserably when tested in the real world. This happens because researchers may have ignored the facts that the real world sampling may not have the luxury and complacency as what they may have in the lab. What this study intends to deliver is the ideal case approach in plant classification and recognition that not only applicable in the real world, but also acceptable in the lab. The consequence from this study is to introducing more external factors for consideration when experimenting real world sampling for leaf recognition and classification does this.

**2) Leaf classification in sunflower crops by computer vision and neural networks**

**Author: Arribas, J.I., Sánchez-Ferrero, G.V., Ruiz-Ruiz, G., Gómez-Gil, J.**

In this article, we present an automatic leaves image classification system for sunflower crops using neural networks, which could be used in selective herbicide applications. The system is comprised of four main stages. First, a segmentation based on rgb color space is performed. Second, many different features are detected and then extracted from the segmented image. Third, the most discriminable set of features are selected. Finally, the Generalized Softmax Perceptron (GSP) neural network architecture is used in conjunction with the recently proposed Posterior Probability Model Selection (PPMS) algorithm for complexity selection in order to select the leaves in an image and then classify them either as sunflower or non-sunflower. The experimental results show that the proposed system achieves a high level of accuracy with only five selected discriminative features obtaining an average Correct Classification Rate of 85% and an area under the receiver operation curve over 90%, for the test set

**3) Leaf classification using shape, color, and texture features**

**Author: Kadir, A., Nugroho, L.E., Susanto, A., Santosa, P.I.**

Several methods to identify plants have been proposed by several researchers. Commonly, the methods did not capture color information, because color was not recognized as an important aspect to the identification. In this research, shape and vein, color, and texture features were incorporated to classify a leaf. In this case, a neural network called Probabilistic Neural network (PNN) was used as a classifier. The experimental result shows that the method for classification gives average accuracy of 93.75% when it was tested on Flavia dataset, that contains 32 kinds of plant leaves. It means that the method gives better performance compared to the original work.

**4) An implementation of leaf recognition system using leaf vein and shape**

**Author: Lee, K.-B., Hong, K.-S.**

In this paper, we propose and implement a leaf recognition system using the leaf vein and shape that can be used for plant classification. The proposed approach uses major main vein and frequency domain data by using Fast Fourier Transform (hereinafter, FFT) methods with distance between contour and centroid on the detected leaf image. Total 21 leaf features were extracted for the leaf recognition, which they include ① the distance feature between centroid and all points on the leaf contour, ② frequency domain data by FFT that was performed using the distances. In summary, 10 features of all the 21 leaf features were extracted using distance, FFT magnitude, and phase, the other 10 features were extracted using t the digital morphological features using four basic geometric features and five vein features, and the last 1 feature was extracted using the convex hull. To verify the validity of the approach, images of 1907 leaves apply to classify 32 kinds of plants. In the experimental results, the proposed leaf recognition system showed an average recognition rate of 97.19%, and we can confirm that the recognition rate of the proposed leaf recognition system was better than that of the existed leaf recognition method.

**5.** **Image Processing For Smart Farming: Detection Of Disease And Fruit Grading**

**AUTHORS:** Monica Jhuria, Ashwani Kumar, and Rushikesh Borse

Due to the increasing demand in the agricultural industry, the need to effectively grow a plant and increase its yield is very important. In order to do so, it is important to monitor the plant during its growth period, as well as, at the time of harvest. In this paper image processing is used as a tool to monitor the diseases on fruits during farming, right from plantation to harvesting. For this purpose artificial neural network concept is used. Three diseases of grapes and two of apple have been selected. The system uses two image databases, one for training of already stored disease images and the other for implementation of query images. Back propagation concept is used for weight adjustment of training database. The images are classified and mapped to their respective disease categories on basis of three feature vectors, namely, color, texture and morphology. From these feature vectors morphology gives 90% correct result and it is more than other two feature vectors. This paper demonstrates effective algorithms for spread of disease and mango counting. Practical implementation of neural networks has been done using MATLAB.