# AYURVEDIC MEDICINAL PLANT SPECIES IDENTIFICATION USING IMAGE PROCESSING TECHNIQUES


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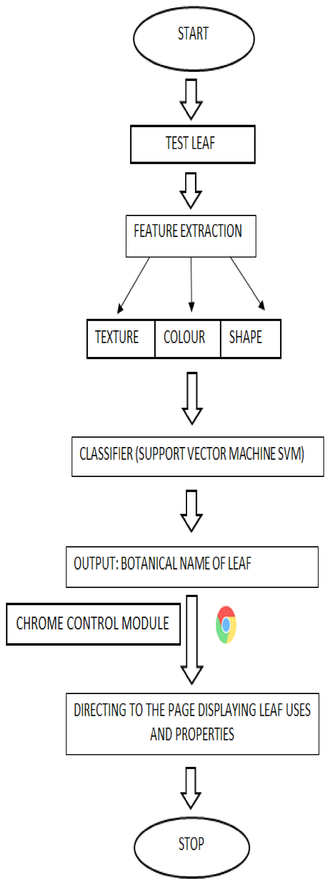
## Abstract

Identification of plants is a difficult task considering the lack of awareness about the local flora. Thus an automated identification system is a highly beneficial and superior option. Information about local plants is essential for plants and herbs-based medicine systems like Ayurveda. This paper focuses on the utilization of image processing techniques to extract morphological, texture-based, and color-based features from test images scanned using a camera and to compare these features using a support vector machine (SVM) for classification to detect leaf species with accuracy higher than 85%.


## System Design



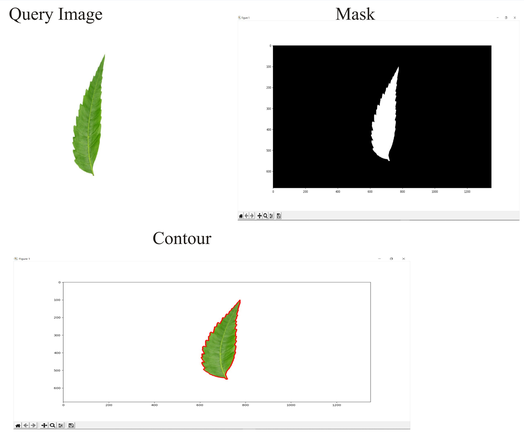

## Mathematical Expression Involved

1. SVM natively is binary classifier i.e. each datapoint can either lie on one side of the hyperplane .Support vectors are datapoints nearer to hyperplane which defines the margin. The generalized equation of a hyperplane is given by:

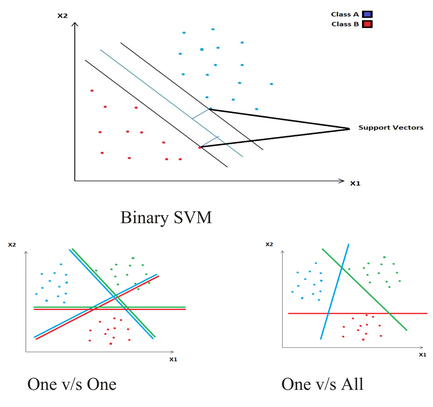
   (w^T).x = 0 or w.x + b = 0

2. After obtaining the hyperplane, we can then use the hyperplane to make predictions. The hypothesis function h is :

$$h(x_i) = \begin{cases} +1 & if\ w \cdot x + b \geq 0 \\ -1 & if\ w \cdot x + b < 0 \end{cases}$$




**DRAWING CONTOURS ENCLOSING LEAF**



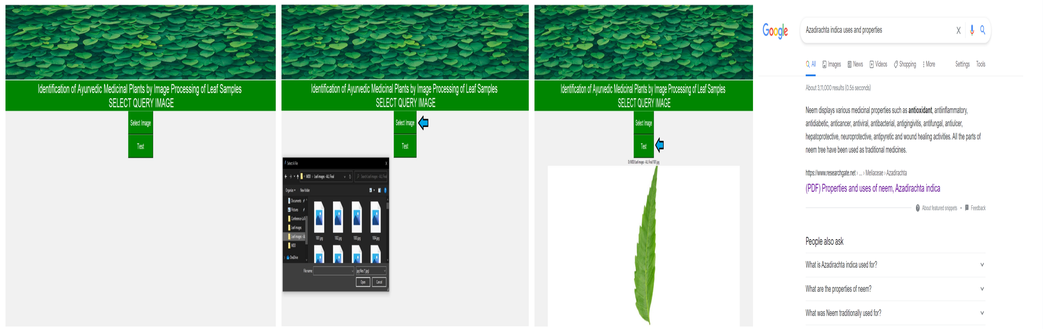

**SUPPORT VECTOR MACHINE CLASSIFIER**

## Methodology

1. Upload query image
2. Extract features from leaf image
   - Morphological features,
   - Texture based features,
   - Color based features
3. Store Features in vector
4. Classification
5. Output as botanical name of leaf species
6. Uses and properties of species displayed on web page of selected browser

## Results and Interface

The system contains a dataset of 470 sample images comprising 47 different species having 10 samples each from a custom made dataset comprising images from web and from Flavia leaf dataset. The dataset is divided into training and testing sets by a ratio of 0.33 i.e. 315 training samples and 155 testing samples. The classifier model is trained on the various morphological,texture -based and color gradient-based features to provide an accuracy of 86.5%




## Conclusions and Future Work

Ayurveda, being an ancient practice based on plants, plays a crucial role in the medicinal industry. Extracting and identifying these medicinal plants is even more important. This project proposes multiple algorithms to identify the leaf species using image processing. In this paper, we have discussed Contouring, feature extraction of the leave samples, and finally, by the use of SVM classifier, system will output the botanical name of the leaf. As well as the incorporated GUI system i.e. Chrome control enables us to display the leaf uses and properties. Future scope of the study includes augmentation of new features in feature vector like venation patterns of leaf.In addition to this more number of samples per species can enhance the accuracy of the model. Moreover drafting of standard database of Ayurvedic plants can be supportive. Standalone dedicated hardware implementing the following algorithms can be constructed. Software application based on this methodology can be developed for portable devices.

## References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