

Recognizing Matured Cinnamon Tree Using Image Processing Techniques.

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Abstract— Cinnamon cultivation is the main income source of a set of areas in Sri Lanka. Peeling cinnamon is a complex task of the cinnamon harvesting process after identifying the matured cinnamon trees. Expertise knowledge is essential to identify matured trees using the traditional method. Otherwise, it may cause the wastage of cinnamon, by cutting immature cinnamon trees. This research addresses the automated system to recognize the matured cinnamon trees using image processing techniques which can be used to identify the matured cinnamon trees without any expert knowledge. All the trees that are selected to this study are more than three year old. Image preprocessing, algorithm selection and use the Speeded Up Robust Features (SURF) features to extract data from leaves and at last, prediction of the maturity level of cinnamon trees using Support Vector Machine (SVM) classifier are the main phases of this study. Hundred cinnamon trees were tested from two different farms and the system performed 68.0% accuracy for matured trees and 86.0% accuracy for immature trees.

Keywords— Image processing; SURF; SVM

I. INTRODUCTION

Sri Lanka is rewarded as the major cinnamon producer in the global markets. The cinnamon made the considerable foreign exchange of agricultural plant products of the country and supplied 90% of the cinnamon demand in the world. Many countries import cinnamon from Sri Lanka because it has a special taste and aroma [1].

Cinnamon bark is made as quills to sell in Sri Lanka. After removing unwanted branches from the harvested stick, outer corky tissues are removed. Then, the cinnamon bark is carefully eliminated from the stick. This process is called as a peeling process. Finally, cinnamon quills are prepared by joining cinnamon barks and fill with them using small pieces [2].

If the cinnamon tree is not matured enough, the heaviest parts of the cinnamon barks are left on the stick. It results in the loss of the best part of the cinnamon in the peeling process. Moreover, the value of cinnamon will rise up, if cinnamon barks are composed as a quill. The cinnamon tree should be matured enough to make cinnamon quills, as shown in Fig. 1. Hence, the recognition of the proper harvesting tree, people need an appropriate method for the recognition of matured cinnamon tree before cut it down completely. The lack of knowledge about the maturing stages, labourers and the new generation seemed to cause more waste and loss in return on investment (ROI).

The experts and researchers found that the maturity level can be recognized by observing the color variation of

cinnamon leaves [3]. Color and shape of the cinnamon leaves are shown in Fig. 2. According to some local expert, the color variation of the cinnamon leaves among matured and immature trees may help to differentiate the trees visually. This visual difference among the matured and immature tree leaves help to use image processing techniques to automate this process. Then the matured cinnamon tree can be easily identified without any expert assistance in an efficient manner. The automation techniques further can be used with a smartphone to make the process easy as smartphones are invaded all over the island.



Fig. 1. The cinnamon bark got from Matured



Fig. 2. Color and shape of the cinnamon leaf.

II. METHODOLOGY

The newly proposed methodology to recognize the maturity level of cinnamon tree is clearly shown in Fig. 3.

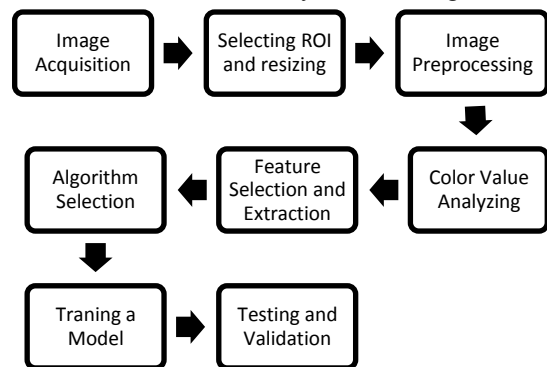


Fig. 3. Flow of methodology for the research

Images of thousand cinnamon leaves from each 50 mature and immature cinnamon trees were taken for analysis, 10 leaves from 10 different branches in each tree. Cinnamon trees were selected under recommendation by an expertise person.

Set of images for the study were captured using NIKON D7100 model with 24.1 megapixels. Shattered speed is 1/160 sec, mode of camera was in manual where ISO value is 200, and the focal length is 200 mm. The light box is shown in Fig. 4, used to capture the images in a constant environment.