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An image processing approach to detect the quality of cinnamon sticks

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Cinnamon is one of the most important and valuable spices in Sri Lanka. Sri Lanka ranks first in world cinnamon production and has a long-standing reputation in the international market due to its unique quality, colour, flavour, and aroma. While Sri Lanka is a world market leader, meeting quality standards is a major issue Sri Lankan cinnamon exporters face. There are several types of cinnamon grades and different prices for each grade. The selling price of cinnamon will be determined by the most available type of grade in a cinnamon bale. However, in real practice, the quality grades of cinnamon bales are determined through collectors' experience and knowledge, and there is no automated system to accurately identify the quality of cinnamon. Therefore, in some situations, disadvantages arise for the farmers when the majority of sticks in a bale are from a lower grade, where they will not get a suitable price for the higher grade portion. To address these issues, this study presents an image processing method to automatically detect the quality grades of cinnamon quills without any expert knowledge. Mainly, the quality of cinnamon quills will be measured based on the diameter, ash percentage, length, and colour. The current study has developed a model by considering all these four factors. As there are slight differences between each grade, a highly precise solution is needed to detect the grades accurately. Therefore, especially the image collection and pre-processing were done with extra caution. During the phases; calculating the diameter, finding the percentage of patches, and calculating the length, the accuracy of the results were evaluated based on a reference issued by the department of export agriculture, Sri Lanka. This reference contains the standardized values of maximum diameter, maximum patch percentage, minimum length, and the number of sticks per kilogram according to each cinnamon grade. Moreover, the accuracy of the measurement of colour was evaluated against a reference(DSLS 81) supplied by the Sri Lankan Standards Institute. The individual accuracies of each stage were 73, 85, 80, and 68 percent in measuring the diameter, colour, length, and patch percentage, respectively, and the accuracy of the final result was around 65 percent. In conclusion, this model will help to identify the quality of cinnamon quills accurately and efficiently compared to manual measurements.

Keywords: Ash percentage, Cinnamon grades, Color, Diameter, Image processing