

A Novel Method to Measure The Water Content of The Leaves Using Digital Image Processing

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Leafy product industries like Tea, Tobacco, Palmyra, Leafy vegetables, and Ayurveda productions play a significant role to uplift the Sri Lankan economy. The water content in the leaves is an essential factor for leafy productions to maintain their quality. Naked eye observation of an expert is the general method to identify the water content. The objective of this study is to introduce a novel and easy method to measure the water content of the detached plant leaves using digital image processing. As a result, a simple computational water content prediction method has been built using image processing techniques to obtain a quality output at the end of production processes. The findings of this study help to identify the water content without an expert in an efficient manner. First, the colour images were captured in a control environment, while leaves were drying and simultaneously the weight was measured traditionally to find the water loss. Features were analysed from images to find the best features, which show a better correlation with the changes of the water content in the leaves. The basic features such as homogeneity, energy, contrast, variance, mean, median, min, max, range, kurtosis, skewness, standard deviation, entropy, correlation and IQR were extracted. The best features among the selected features have been chosen through correlation test. The classification was done with the K-Nearest neighbour algorithm by training with the selected best features of the training set of images. The green matrix of the RGB image is taken for the feature extraction to get better results. Finally, a simple model was built using the significant features which have a relationship with the water content measurement. 65.3% accuracy has been achieved, and this model can be used to predict the water content of a particular green leaf through images. This model will be a turning point for measuring the water content of the leaves in the industries in an automated manner.

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