A SMART METHOD OF ESTIMATING THE MATURITY OF TEA LEAVES

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Abstract

In the agriculture sector, the most labor-intensive tasks are now being replaced by modern technology. One example is the semi-automated tea harvesting machine, which was recently introduced by the Tea Research Institute (TRI) of Sri Lanka. The "matureness of plucked tea leaves" is considered to be an important property in the tea industry. . However, detecting maturity by visual inspections requires skilled labor with trained eyes, becoming scarce in recent years. Although semi-automated tea harvesting machines can perform the task of several labours, due to inherent limitations, manual sorting is often required to remove mature foliage and twigs from the harvested crop.. Thus, we propose a novel automated system that can correctly distinguish between mature and immature leaves at the time of harvesting. Our system uses contact imaging technique and a newly developed Neural Network (NN). A simple apparatus with an adjustable platform that helps in aligning the mobile phone camera, the backlight source, and the leaves was designed to demonstrate the proposed system's validity. The use of contact imaging ensured that environmental conditions had little influence over captured images. Literature indicates that the matureness of leaves can be determined by analyzing the color spectrum of the captured images, albeit limited studies have explored tea leaves. Thus, most correlated color indexes extracted from the photos taken were selected as features for the learning algorithm. Tests were performed using selectively captured images (i.e. sample) of 450 tea leaves from some tea estates in Badulla district. While 80% of the sample were used for training, the remaining 20% was used for testing. Overall, the system achieved accuracy of over 95%. The proposed system can also be integrated within any semi-automated machine or used separately as a sorting machine. A mobile application was developed to show real-time results in the smartphone.

Keywords: *Contact Imaging, Matureness of leaves, Neural Network*