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An application of image processing techniques in identifying herbal plants in Sri Lanka

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Sri Lanka which is a tropical country situated in South Asian region has a considerable collection of plant species have been utilized by generations as medicinal treatments for a variety of diseases. These diseases ranges from complicated situations such as diabetes, arthritis to cancer and are known to be completely cured using the traditional methods used in Ayurvedic medicines mainly extracted from herbal plants. Dissemination of knowledge regarding herbal plants is restricted mainly to very limited group of people and is passed down from generation to generation who practice traditional medicine. In this study, we therefore attempt to identify herbal plants using machine learning analysis in order to assist more locals to identify them. Among many herbal plants, 5 are chosen to analyze further in detail and the images of the plants will be acquired from social media, Institute of Ayurveda and Alternative medicine website and blogs related to Sri Lankan herbal plants creating a noisy web data set. Several existing algorithms will be analyzed in order to select the suitable algorithms to classify the selected 5 plants accurately and to suggest how they can be used for treatments as recommended by Institute of Ayurveda and Alternative medicine. The main objective of the study is to analyze the noisy image set using deep neural network architectures based on transfer learning, choose the best architecture and create a deep learning model that can be applied effectively for an application. The outcome of this study will be used by locals in identifying herbal plants accurately. The methodology includes gathering data from Institute of Ayurveda and Alternative medicine on plant details and transfer learning based on deep Convolutional Neural Networks used on noisy image set for processing them using tensorflow in a local computer. Images will be retrained on the available neural network architectures such as GoogleNet, Inception v2 and Inception v4 architectures, fine-tuned from pre-trained weights and then the best technique will be selected. The selected algorithm will be fine-tuned using data augmentation techniques on the labeled dataset and hyper-parameter tuning. Conclusively, this study will provide valuable information regarding the herbal plants and possible treatments and help to disseminate knowledge to future generations.

Keywords: Data augmentation, deep convolutional neural network, hyper-parameter tuning, transfer learning