

## Comparative analysis of deep learning architectures for image classification on Sri Lankan ayurvedic medicinal plants

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Deep learning has recently evolved into a potent tool for image classification, compared to the traditional approaches. In this study, comparisons between the performances of three prominent deep learning architectures-ResNet50, VGG19, and InceptionV3 with respect to multi-class image classification tasks pertaining to Sri Lankan Ayurvedic medicinal plants were made. Each of the models was trained using a custom diversified dataset with more than 5000+ images of four classes of commonly used medicaments in Sri Lankan ayurveda. Model accuracy and loss were recorded. This dataset contained images of four plants highly valued in Sri Lankan traditional medicine: "Curry" (*Murraya koenigii*), "Neem" (*Azadirachta indica*), "Mint" (*Mentha arvensis*), and "Rubble" (*Coleus amboinicus*). The image size for ResNet50 and VGG19 was (224, 224), and for InceptionV3, it was (299, 299), with a batch size of 32 for all models. The base models were pre-trained on ImageNet, with ResNet50 and VGG19 excluding the top layer and additional layers including GlobalAveragePooling2D and Dense layers, and InceptionV3 using similar architecture but with its specific input size requirements. The optimizer for all models was Adam, with a learning rate of  $1e^{-5}$  for ResNet50 and  $1e^{-4}$  for InceptionV3 and VGG19. All base model layers of ResNet50, InceptionV3 and VGG19 were frozen. Finally, VGG19, InceptionV3 and ResNet50 achieved validation accuracies reaching, 89% 86% and 80% respectively. This comparative analysis can be applied to assist in the identification, better documentation and utilization of ayurveda knowledge to ensure the safety and efficacy of traditional medicinal practice. Ayurveda and its application, when integrated with deep learning technologies, would preserve the ancient knowledge of ayurveda and result in better healthcare outcomes.

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