

Multi-Labeled Aromatic Medicinal Plant Image Classification Using Deep Learning

Authors : Tsega Asresa, Getahun Tigistu, Melaku Bayih

Abstract : Computer vision is a subfield of artificial intelligence that allows computers and systems to extract meaning from digital images and video. It is used in a wide range of fields of study, including self-driving cars, video surveillance, medical diagnosis, manufacturing, law, agriculture, quality control, health care, facial recognition, and military applications. Aromatic medicinal plants are botanical raw materials used in cosmetics, medicines, health foods, essential oils, decoration, cleaning, and other natural health products for therapeutic and Aromatic culinary purposes. These plants and their products not only serve as a valuable source of income for farmers and entrepreneurs but also going to export for valuable foreign currency exchange. In Ethiopia, there is a lack of technologies for the classification and identification of Aromatic medicinal plant parts and disease type cured by aromatic medicinal plants. Farmers, industry personnel, academicians, and pharmacists find it difficult to identify plant parts and disease types cured by plants before ingredient extraction in the laboratory. Manual plant identification is a time-consuming, labor-intensive, and lengthy process. To alleviate these challenges, few studies have been conducted in the area to address these issues. One way to overcome these problems is to develop a deep learning model for efficient identification of Aromatic medicinal plant parts with their corresponding disease type. The objective of the proposed study is to identify the aromatic medicinal plant parts and their disease type classification using computer vision technology. Therefore, this research initiated a model for the classification of aromatic medicinal plant parts and their disease type by exploring computer vision technology. Morphological characteristics are still the most important tools for the identification of plants. Leaves are the most widely used parts of plants besides roots, flowers, fruits, and latex. For this study, the researcher used RGB leaf images with a size of 128x128 x3. In this study, the researchers trained five cutting-edge models: convolutional neural network, Inception V3, Residual Neural Network, Mobile Network, and Visual Geometry Group. Those models were chosen after a comprehensive review of the best-performing models. The 80/20 percentage split is used to evaluate the model, and classification metrics are used to compare models. The pre-trained Inception V3 model outperforms well, with training and validation accuracy of 99.8% and 98.7%, respectively.

Keywords : aromatic medicinal plant, computer vision, convolutional neural network, deep learning, plant classification, residual neural network

Conference Title : ICCAI 2023 : International Conference on Computing and Artificial Intelligence

Conference Location : Jeddah, Saudi Arabia

Conference Dates : November 20-21, 2023