Computationally Light Tree Species Classification Using RGB Bark Images

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The cost of forestry increases each year. Although there are currently many deep learning studies addressing the issue of tree species classification in the various forestry tasks, the challenge of a deep learning model that can classify tree species on a cost-effective mobile device using RGB bark images has not yet been addressed. Thus, the purpose of this project is to construct a computationally light CNN model that can be deployed to easily accessible mobile devices without a significant sacrifice in accuracy. The resulting software could then assist with both autonomous forestry systems as well as human ecologists. The model was trained and tested on over 7000 images using publicly available RGB bark images captured by various smartphone devices. The images were first scaled down and converted to a 224 by 224 grayscale to reduce the cost of computation and reduce noise. Then, the data was repeated three times to a size of 224 by 224 by 3 in order to fit the input layer of the deep learning model. After testing and fine-tuning hyperparameters, the model was evaluated on a new set of RGB bark images, and it demonstrated an accuracy of 96.58% in classifying the different tree species. These results suggest that the developed model would be a practical and cost-effective approach for forestry tasks. Although the model was not deployed to a mobile device in this project, the lightweight framework can easily be integrated to accessible mobile devices.

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