**Improving Accuracy of Multi-Class Image Classification using Ensemble Learning of Convolutional Neural Networks**

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**ABSTRACT**

Multi-class image classification is one of the tasks of computer vision in which convolutional neural networks are widely used. In this paper, we create a novel ensemble learner by stacking InceptionV3, Xception, MobileNetV2, and ResNet50 convolutional neural network in an attempt to outperform the best performance of each individual models. In an ensemble learning algorithm, by combining multiple different models with different architectures, an error of prediction from a single model can be corrected by other models, thus reducing the likelihood of selecting a wrong prediction. The dataset that we used to do benchmarking is the Intel Image Classification dataset which consists of 6 classes that displays images of fully colored natural scenes. The training set consists of 14034 images, while the test set consists of 3000 images, all having 150x150 as their default size. The training process on all models involves reducing their learning rate when the performance plateaus, and early stopping if there aren't any significant improvements from an epoch to the next. The result is that each individual models have an average of 83% accuracy, yet our ensemble model managed to reach 88% on the test set.

*Keywords: Image Classification; Computer Vision; Artificial Intelligence; Neural Network; Ensemble; Stacking; Deep Learning; Machine Learning*