

ABSTRACT

VGG16NET HYBRID ALGORITHM WITH SUPPORT VECTOR MACHINE IN DETERMINING WASTE TYPES

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The VGG16 deep learning architecture has proven to be very effective in classifying images on ImageNet datasets, but it has limitations such as a very large number of parameters and the potential for overfitting on small datasets. SVM has the advantage in dealing with overfitting problems on relatively small datasets, while VGG16 has the advantage in extracting quality features from images with very good performance. SVM can also help improve classification performance on VGG16 by minimizing the risk of overfitting and increasing classification accuracy on relatively small datasets. Therefore, the authors chose the VGG16Net hybrid algorithm with Support Vector Machine in Garbage Type Classification, which later the VGG16 architecture is used for feature extraction from images and these features are used as input for SVM. The decision to use VGG16 in combination with SVM was to improve the classification accuracy of the junk image dataset, however, the use of SVM requires proper parameter selection and appropriate data pre-processing techniques to achieve good results. And in this study the authors succeeded in classifying garbage images, accuracy before hybrid svm got 94.52% training accuracy and testing (validation) accuracy of 87.85%. and the loss results get training loss of 0.58 and testing loss accuracy of 12.5%. After doing hybrid vgg16 with svm, training accuracy was 99.87% and testing (validation) accuracy was 91.76%. For loss results, training loss is 0.13 and testing loss accuracy is 8.24%. Therefore, the VGG-16Net CNN architecture combined with SVM can produce a good classification model, especially on relatively small datasets and can be an appropriate choice in image classification.

Keywords: Convolutional Neural Network, Image, Deep Learning, Trash, Support Vector Machine, VGG16-Net