ABSTRACT

Waste management is one of the environmental problems faced by various countries, including Indonesia. Sorting recyclable waste, such as cardboard, metal, paper, glass, and plastic, has the potential to be a solution to reduce the volume of waste sent to landfills. Convolutional Neural Network (CNN) technology can be used to develop a model that automatically sort these waste. CNN is able to recognize objects from image data. However, its effectiveness is highly effected by the quality of the image and overall dataset. The presence of outliers in a dataset can cause the model to learn from the wrong images and reduce the model's accuracy. Identification of outliers in image data is carried out in three stages, namely: extracting image features using CNN, reducing feature dimensions using Uniform Manifold Approximation and Projection (UMAP), and detecting outliers using Interquartile Range (IQR). The application of this method to the trashnet dataset successfully detected outliers in two classes (Metal and Plastic), and no outliers in the other three classes (Cardboard, Glass, Paper). The CNN model designed using the Residual Network (ResNet) architecture trained on the original dataset achieved an accuracy of 87%. Meanwhile, the same model trained on data with outliers removed achieved an accuracy of 90%.

Keywords: Recyclable Waste, Convolutional Neural Network, Outlier Detection, Uniform Manifold Approximation and Projection, Interquartile Range