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DEEP LEARNING BASED DETECTION AND MANAGEMENT OF SCRAP MATERIALS

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Abstract

This research study offers a novel method that uses deep learning to improve the processing of scrap materials segregation and management. There is no need to stress the importance of effective scrap management. The data was obtained from Kaggle and reorganized into forty-three classes. Classes with low data were improved by downloading additional images from Google search and taking photo shots. This model aims to identify and classify scrap materials (plastic, glass, etc.) composed of 43 types of scrap items. Convolutional Neural Networks (CNNs) with computer vision, a cutting-edge technology, are used with particular emphasis on methods investigated for comparison, including Logistic Regression, AdaBoost, and Random Forest for classifying material. The model's training phase shows an astounding 95% accuracy in classifying waste items. At the same time, the results of testing data sets for different objects show different accuracies ranging from 80 – 90%. Ultimately, CNN and logistic regression were found to be the promising option because of their sophisticated object-detecting skills, even though Logistic Regression gave good competition because of few evaluation parameters. Additionally, it goes a step further by recommending appropriate recycling routes for the scrap that can be recycled. The concept speeds up the collection and transportation of recyclable waste by automating segregation. The operational difficulties that companies involved in managing discarded materials must deal with are directly addressed by this paper. Importantly, this practical strategy may provide a solid response to India's urgent scrap management challenges. The model is in line with circular economy principles and sustainable business practices. This research extends its advantages to supply chain management and enterprises by fostering sustainability. Considering the global trend toward sustainability, the appeal of implementing such ecologically friendly methods not only addresses the current but also plots a road for future prosperity.

Key words: circular economy, computer vision, convolution neural network, deep learning, scrap material segregation, waste management

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