

An Efficient Approach for Recyclable Waste Detection and Classification Using Deep Learning

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Abstract : One of the world's most pressing issues right now is the lack of a competent waste management system, particularly in emerging and underdeveloped countries. Recycling solid waste, which comprises numerous dangerous non-biodegradable sub-stances like glass, metals, plastics, etc, is the most essential step in reducing waste-related issues in the environment. Typically, collected waste includes all types of waste that must be thoroughly sorted to be recycled efficiently. Most countries use manual waste sorting techniques, which are efficient. Nevertheless, the waste sorting process by human beings is not safe as there is always a risk of exposing themselves to toxic wastes, which could be serious for their health. Our thesis presents a Deep Learning technique based on computer vision for automatically identifying waste. To construct the model, we used Convolutional Neural Networks, real-time object detection systems, such as YOLOv5 and YOLOv7, as well as several transfers learning-based architectures, including VGG16, MobileNet, Inception-Resnet-v2. The model is trained on numerous images for each type of waste to ensure no overfitting and greater accuracy. The highest accuracy we achieved for our waste detection model YOLOv5x, is 93.7%.

Keywords : deep learning, object detection, YOLOv7, image processing, computer vision

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