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Waste Classification for Effective Organic and Inorganic Waste Management Using Deep Learning

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Abstract: *Efficient waste management is vital for promoting a clean and sustainable environment. However, traditional methods of waste sorting are manual, time-consuming, and prone to errors especially in urban areas where large volumes of waste are generated daily. This research introduces a deep learning approach to automatically classify waste into organic and inorganic categories using Convolutional Neural Networks (CNNs). The model was trained on a diverse dataset of waste images and improved using data augmentation techniques and regularization methods such as dropout and batch normalization. Achieving a classification accuracy of over 93%, the model demonstrates strong potential for integration into smart bins and automated sorting systems, where it can operate in real-time with minimal hardware. By reducing human intervention and improving classification accuracy, this approach contributes to smarter, faster, and more eco-friendly waste management solutions.*

Keywords: Natural Language Processing (NLP), Multi-Model ChatBot, Large Language Models (LLMs), Domain-Specific Language Models, Conversational AI

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