

Facilitating citizen science initiatives for waste management via machine learning in Scilab

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Abstract

Effective waste segregation is a cornerstone of sustainable urban management, yet manual sorting remains labour-intensive. This case study presents the design and implementation of a neural network-based waste classification system utilizing the IPCV (Image Processing and Computer Vision) and ANN (Artificial Neural Networks) toolboxes of Scilab. The methodology integrates image processing techniques and artificial neural networks to automate the identification and categorization of waste into four key classes: Hazardous, Non-Recyclable, Organic, and Recyclable. The interactive image-uploading feature for citizen demonstrates real-time classification capabilities. The model interpretability for both technical and non-technical stakeholders is supported by schematics. The Government of India has launched digital platforms enabling citizens to report waste and civic issues, yet these lack automated classification or guidance regarding disposal methods. This case study highlights that the current indirect process can be streamlined by implementing Scilab-based machine learning pipelines, offering a scalable and transparent framework for automated waste management.

References

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