



NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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Batch Number	CB7
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Guide	Dr. S. N. Tirumala Rao, M.Tech., Ph.D.
Title	SmartWasteNet: A Deep Learning Framework to Transition from Take-Make-Waste to Rethink-Redesign-Reuse for Circular Economy under SDG 12
Domain/Technology	DEEP LEARNING
Base Paper Link	https://link.springer.com/article/10.1007/s13762-02506488-0
Dataset Link	https://drive.google.com/file/d/1P7XKAEnTtonVxpRQ2SlGDjji-69QmMAK/view?usp=sharing
Software Requirements	Browser: Any latest browser like Chrome Operating System: Windows 7 Server or later Python (COLAB)
Hardware Requirements	SystemType: Intel Core i5 or above RAM: 8 GB Number of cores: 5 Number of Threads: 4
Abstract	The rapid urbanization happening in India has resulted in a significant increase in municipal solid waste (MSW), which calls for creative and sustainable waste management strategies. This project introduces a deep learning framework that aligns with the circular economy principles—Rethink, Redesign, Reuse—to support Sustainable Development Goal 12 (SDG 12). By gathering data from 59 Indian cities, including MSW generation, recycling rates, SDG indicators, and city demographics, we created a comprehensive dataset for analysis. To cluster cities based on circularity indicators, we used an unsupervised learning approach with an autoencoder, assigning each city a relevant circular economy action. We trained five supervised deep learning models (MLP with 1-layer, 2-layer, Dropout, Batch Normalization, and WideDeep MLP) to classify cities into these actions. Notably, the Dropout_MLP model stood out, achieving an impressive 97.86% accuracy in classifying circular economy actions. To enhance model interpretability, we utilized SHAP, which helped identify key features that influence decisions, such as SDG scores and recycling efficiency. This framework not only predicts waste patterns but also offers practical circular economy recommendations tailored for each city. It's designed to be scalable and explainable, providing urban policymakers with the insights they need to make informed, sustainable decisions that promote a circular economy.

Signature of the student(s)

Signature of the Guide

Signature of the project coordinator