

A STUDY OF YOLO V7 ALGORITHM TO PREDICT BIODEGRADABLE AND NON-BIODEGRADABLE SOLID WASTE

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Abstract: Solid waste management plays a crucial role in the Smart City and Clean India mission by effectively separating waste into recyclable and energy-generating categories. A Manual waste separation is risky and time-consuming, so an automated system is proposed in this paper. When waste is thrown into a dustbin, an image is captured and compared with a dataset using the Faster R-CNN algorithm. The dataset includes various objects such as food, plants, fruits, plastics, metals, batteries, paper, and cardboard, each labelled accordingly. OpenCV and TensorFlow are used to analyse the captured image and determine whether the object is biodegradable or non-biodegradable, drawing a boundary box around it. This research extends to the future by considering the conversion of separated biodegradable waste into energy through Bio-Methanation plants.[4] The goal is to reduce landfill waste to less than 5%, which would significantly benefit the overall ecosystem and environment by preventing pollution. Coimbatore's proximity to the Western Ghats, an important hotspot, highlights the significance of solid waste management in preserving the environment and receiving the southwest monsoon. Implementing automated waste categorization systems and promoting sustainable waste management practices are crucial for achieving the objectives of the Smart City and the Clean India mission, leading to a cleaner and greener environment. [3]

Keywords: Faster R-CNN, OpenCV, TensorFlow, Bio-Methanation, biodegradable, non-Biodegradable

INTRODUCTION

In Tamil Nadu more than 59 % of waste ends up in landfills that contaminate the soil, ground water and emit dangerous greenhouse gases. The manual separation of biodegradable and non-biodegradable wastes can't succeed. The TN government constructs Bio-Methanation Plant to generate energy from Biodegradable waste constructed at Bharathi Park, Coimbatore which generates 150 – 170 Unit of electricity per day. The main problem is that the unit can't get biodegradable waste in proper manner. The aim of the project is to use 99 % in an effective manner without ends up in landfills. [1] This can be achieved by separating the waste in two different mediums to recycle and generate energy. This research is focused on this area to make India as a success in Smart City mission and Clean India. Waste management places a vital role in the Smart city and Clean India mission that can be achieved by separating the solid waste into two medium and make use of those waste effectively for recycling and energy production. The management activity performed on solid waste management will safe guard the environment in a healthy way. At present 59 % of waste are ends in landfills in India which become a main source on affecting the eco system and environment. This can be reduced from 59 % to less than 5 % by using recycling and WtE project. [2]

The purpose of using Deep Learning is to predict the type of waste by attaching the camera in the dustbin which will capture the image of the waste material thrown into the dustbin. The API will be trained by MS COCO dataset (Common Object in Context) which will be compared with the captured image to predict a level of waste medium.

- Medium 1 – Waste for recycle (plastic, metal, glass)
- Medium 2 – Waste for producing energy by using WtE (Waste to Energy) project.