WASTE SEGREGATION USING DEEP LEARNING AND IOT

Mrs. Jayashubha J [*1], Bhushan P[*2], Kumaraswamy N[*3], Lavanya M[*4], Likhitha L Mahesh[*5]

[1*]Asst. Professor, Department of CSE, K S School Of Engineering And Management, Bangalore, India

[2*3*4*5*] student, Department of CSE, K S School Of Engineering And Management, Bangalore, India

ABSTRACT

The waste segregation using deep learning and IOT paper presents an innovative approach utilizing YOLOv5, a state-of-the-art object detection model, for waste segregation specifically targeting biodegradable and non-biodegradable waste. Waste management is a critical global issue, and efficient segregation is pivotal for sustainable and eco-friendly waste disposal practices. The proposed system leverages the YOLOv5 model to accurately detect and classify various types of waste items in real-time. By focusing on biodegradable and non-biodegradable waste, the system identifies and sorts these categories with high precision. The implementation of YOLOv5 for waste segregation demonstrates promising results in automating the sorting process, enhancing waste management practices, and contributing to a cleaner and more sustainable environment. The study showcases the effectiveness and potential of leveraging cutting- edge technology in waste segregation for a more efficient and environmentally conscious approach to waste disposal.

Keywords: Waste segregation,YOLOv5, waste management, biodegradable, Non-biodegradable, Deep learning.

I. INTRODUCTION

Waste management is a critical global challenge as urbanization and population growth continue to escalate. Traditional waste disposal methods often lead to environmental degradation and inefficient resource utilization. To address these issues, modern technologies such as Deep Learning (DL) and the Internet of Things (IoT) are being harnessed to revolutionize waste segregation processes. Deep Learning, a subset of artificial intelligence, has shown remarkable capabilities in image recognition and classification. By leveraging DL algorithms, waste segregation can be automated, enhancing accuracy and efficiency. Combined with IoT, which connects physical devices to the internet, a comprehensive and real-time waste management system can be established.

II. . METHODOLOGY

Data Collection and Preparation:

Collect a diverse dataset of waste items, including biodegradable and non-biodegradable materials, and preprocess the data for training the YOLOv5 model.

Model Training:

Utilize the YOLOv5 architecture to train the model for accurate detection and classification of waste items into the specified categories.

Real-time Detection:

Implement the trained model to perform real-time object detection and classification of waste items, particularly focusing on biodegradable and non-biodegradable distinctions.

User Interface Development:

Create a user-friendly interface to visualize the segregation process, allowing users to monitor, verify, and potentially intervene in the classification process if necessary.

Testing and Validation:

Validate the system's performance through rigorous testing, evaluating its accuracy, efficiency, and adaptability to different waste scenarios.

Method and analysis which is performed in your research work should be written in this section. A simple strategy to follow is to use keywords from your title in first few sentences.

III. LITERATURE SURVEY

Earlier methods of waste segregation:

Traditional waste segregation involved manual sorting by waste management personnel or scavengers. Workers sorted through waste at collection points or sorting facilities, separating materials like paper, plastic, glass, and metal by hand.

Innovations in agriculture technology:

In recent years, there have been significant innovations in waste segregation technology, driven by advancements in artificial intelligence, sensor technology, and the Internet of Things(IoT). These innovations aim to improve the efficiency, accuracy, and sustainability of waste management practices.

Applications of deep learning in agriculture:

Deep learning has found various applications in waste segregation, revolutionizing the efficiency and accuracy of the process. Here are some key applications of deep learning in waste segregation. Deep learning algorithms can be trained to recognize and classify different types of materials, such as paper, plastic, glass, and metal. Automated sorting systems equipped with cameras and sensors use these algorithms to sort waste accurately at high speeds.

Waste segregation in future-proof and sustainable:

Future and sustainable waste segregation strategies are likely to incorporate advanced technologies and innovative approaches to address environmental concerns and optimize resource utilization.

IV. CONCLUSION

Waste segregation using deep learning and IoT (Internet of Things) is a promising approach that leveragesadvanced technologies to enhance the efficiency and accuracy of waste management processes.

ACKNOWLEDGEMENTS

We are thankful to Mrs. Jayashubha J, Assistent professor for being our project guide, under whose guidance this project work phase 1 has been carried out successfully.

REFERENCES

[1] K. N. Sami, Z. M. A. Amin, and R. Hassan, ‘‘Waste management using machine learning and deep learning algorithms,’’ Int. J. Persceptive Cogn. Comput., vol. 6, no. 2, pp. 97–106, Dec. 2020, doi: 10.31436/ijpcc.v6i2.165.

[2] S. Shahab, M. Anjum, and M. S. Umar, ‘‘Deep learning applications in solid waste management: A deep literature review,’’ Int. J. Adv. Comput. Sci. Appl., vol. 13, no. 3, pp. 381–395, 2022, doi: 10.14569/IJACSA.2022.0130347

[3] M. Triassi, R. Alfano, M. Illario, A. Nardone, O. Caporale, and P. Montuori, ‘‘Environmental pollution from illegal waste disposal and health effects: A review on the ‘triangle of death,’’’ Int. J. Environ. Res. Public Health, vol. 12, no. 2, pp. 1216–1236, Jan. 2015, doi: 10.3390/ijerph120201216.

[4] A. A. Namen, F. da Costa Brasil, J. J. G. Abrunhosa, G. G. S. Abrunhosa, R. M. Tarré, and F. J. G. Marques, ‘‘RFID technology for hazardous waste management and tracking,’’ Waste Manage. Res., J. Sustain. Circular Economy, vol. 32, no. 9, pp. 59–66, Sep. 2014, doi: 10.1177/0734242X14536463.

[5] S. S. Chandra, M. Kulshreshtha, and P. Randhawa, ‘‘Garbage detection and path-planning in autonomous robots,’’ in Proc. 9th Int. Conf. Rel., Infocom Technol. Optim. Trends Future Directions (ICRITO), Sep. 2021, pp. 1–4, doi: 10 .1109/ICRITO51393.2021.9596382.