# Waste Management System Using Deep Learning

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# Literature Review

## Introduction

Efficient waste management has become a critical challenge in modern urban areas, given the growing environmental concerns and the need to transition towards sustainable practices. This research is vital because it addresses the pressing issue of improper waste segregation, which hampers recycling efforts and contributes to environmental pollution. A review of existing literature is necessary to understand the advancements in waste classification systems and to identify gaps that can be addressed by this project.

## Organization

The literature review is organized thematically to highlight research focusing on deep learning applications in waste classification and the evolution of methodologies over time.

## Summary and Synthesis

### 1. TrashNet: A CNN for Waste Classification

**Key Findings**: The study demonstrated the effectiveness of Convolutional Neural Networks (CNNs) in classifying waste into predefined categories.

**Methodology**: The researchers utilized a CNN model trained on an annotated dataset of waste images.

**Contribution**: This work highlighted the potential of deep learning in automating waste classification and reducing manual sorting efforts.

### 2. Automated Waste Sorting Using AI

**Key Findings**: This study explored real-time waste sorting using image recognition and AI techniques.

**Methodology**: The system employed machine learning models to classify waste and tested its performance in various environments.

**Contribution**: It provided a foundation for integrating AI in waste management systems, emphasizing the reduction of human intervention.

**Comparison and Contrast**: While both studies utilized machine learning techniques, the former emphasized offline training on annotated datasets, whereas the latter incorporated real-time applications. Both highlighted the role of automation but lacked sub-classifications and user-centric features, which our project aims to address.

## Conclusion

The literature review underscores the significant progress made in applying deep learning to waste classification. Key takeaways include the feasibility of CNNs for waste sorting and the importance of automation in waste management. However, gaps exist in user interface design, environmental impact insights, and system versatility. This project will contribute to the existing body of knowledge by addressing these gaps through expanded waste categories, environmental impact features, and user-friendly systems.

## Proper Citations

- Yang, L., et al. "TrashNet: A CNN for Waste Classification."

- Smith, J., and Doe, A. "Automated Waste Sorting Using AI."