CleanTech: Transforming Waste Management with Transfer Learning

1. Introduction

This project leverages Artificial Intelligence and Transfer Learning to automate the classification of blood cell images. By using a pre-trained Convolutional Neural Network (CNN), the model identifies different types of blood cells to support efficient waste management in medical diagnostics. This method increases the speed and accuracy of classification, especially in healthcare environments.

2. Objective

The main goal of the project is to design a system that can accurately classify blood cell images using transfer learning, reducing manual effort and improving the reliability of diagnostic results.

3. Dataset

The dataset used for this project is the Blood Cell Images dataset available on Kaggle. It contains around 12,000 images of blood cells categorized into four types: eosinophils, lymphocytes, monocytes, and neutrophils.

4. Model Architecture

We used a pre-trained MobileNetV2 model with transfer learning to classify the images. The model was fine-tuned with the blood cell dataset to improve prediction accuracy and reduce training time.

5. Web Application

A user-friendly web application is built using Flask. The user uploads an image, which is passed to the model for prediction. The prediction is then displayed on the web interface.

6. Results

The model achieved high accuracy in identifying the cell types, with over 90% accuracy on the test data. The web application performed efficiently in real-time prediction scenarios.

7. Conclusion

This project demonstrates the effectiveness of transfer learning in medical image classification. It provides a scalable, accurate, and efficient solution for waste management in healthcare

diagnostics, and serves as a base for further development in AI-powered healthcare solutions.