



# HACK CMU 2023

Mehul G. • Anirudh M. • Rhik M. • Steven Y.

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01

# THE IDEA



# ECO-BIN

Our autonomous solution to solve waste mismanagement.

It uses a sophisticated ML algorithm to sort trash for everyone!

The background is a light green color with white wavy shapes. It is decorated with stylized green leaves and branches. Two green bottles with black caps are positioned diagonally, one in the top-left and one in the bottom-right. A white circle containing the number '02' is centered above the main title.

**02**

# **WHY IT MATTERS**

# 25

# %

<https://www.mic.com/articles/190974/americans-are-terrible-at-recycling-this-is-what-happens-when-you-put-something-in-the-wrong-bin>



# Drawbacks of Poor Recycling

- Contamination of recyclable materials
- Water pollution from plastic bottles
- Landfill accumulation
- Poor resource managements



The background is a light green color with white wavy shapes. It is decorated with various green leaves and branches. Two light green bottles with dark green caps are positioned diagonally, one in the top-left and one in the bottom-right. In the center, there is a white circle containing the number 03.

**03**

# **IMPLEMENTATION**





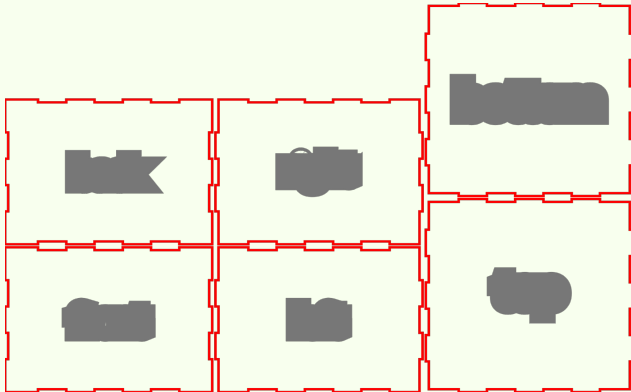
# DESIGNING THE BOX

## CAD SOFTWARE

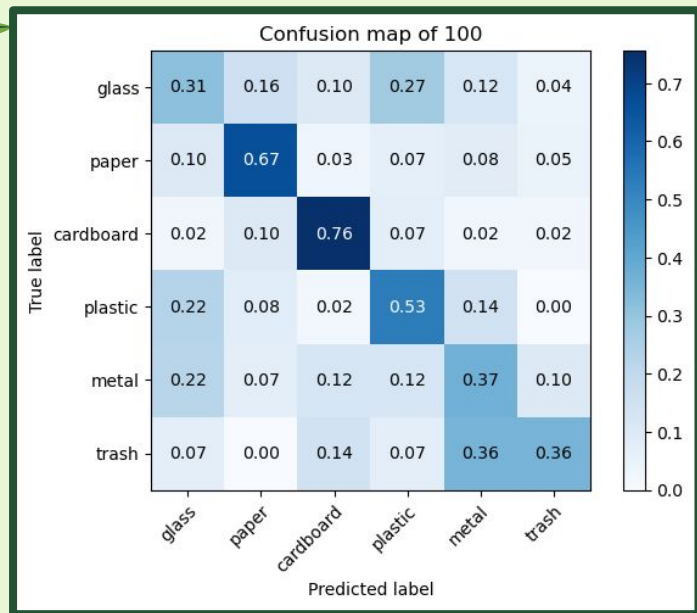
Using a variety of tools including Adobe Illustrator, we created a cutout for the box

## LASERCUT

This was then laser cut, thanks to the makerspace in roboclub onto acrylic and then glued together



# CONVOLUTION NEURAL NETWORK



## WHAT IS IT?

A neural network that applies a variety of layers to change the image and identify features

## HOW DID IT DO?

It had an average accuracy of 0.51 across the variety of our testing data

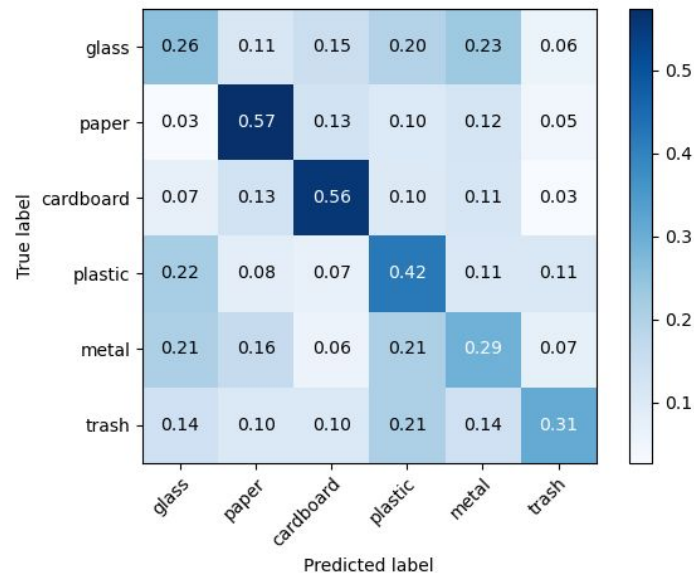
# DECISION TREE

## WHAT IS IT?

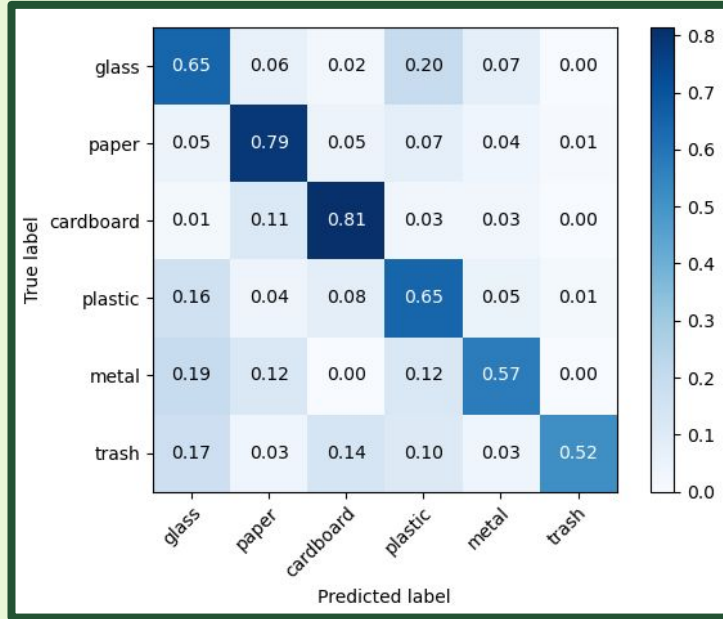
Tree-like model used for classification that breaks makes decisions on smaller subsets

## HOW DID IT DO?

It was prone to overfitting, and had a low accuracy of 0.45



# RANDOM FOREST



## WHAT IS IT?

A form of decision trees that hosts multiple at one time

## HOW DID IT DO?

It had the best accuracy at an average of 0.75 and was not prone to overfitting

The background is a light green color with white wavy shapes. It is decorated with stylized green foliage, including various leaves and branches. Two green bottles with black caps are positioned diagonally, one in the top-left and one in the bottom-right. In the center, the number '04' is displayed in a white circle.

**04**

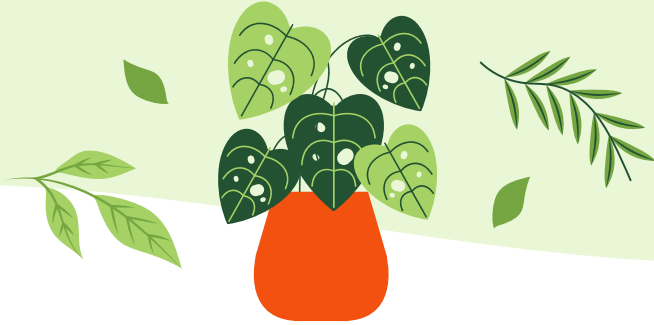
# **APPLICATION**

# Project Applications

- On campus retrofit to improve waste management
- Relatively low cost for savings within trash sorting



# Accessibility & Security



## Accessibility

Normal usage of a trash can  
and accessible to all



## Security

On system storage to prevent  
data leaks and accidental  
photo captures



# THANK YOU!

## DO YOU HAVE ANY QUESTIONS?

[mehulg@andrew.cmu.edu](mailto:mehulg@andrew.cmu.edu)

[anirudhm@andrew.cmu.edu](mailto:anirudhm@andrew.cmu.edu)

[arulm@andrew.cmu.edu](mailto:arulm@andrew.cmu.edu)

[yy6@andrew.cmu.edu](mailto:yy6@andrew.cmu.edu)



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