

# Smart Trash In Smart City

To Keep our Saudi green and clean

رسكلة  
RASKALA



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# Introduction

Recycling is important for the environment in today's world. Recycling means when we are using old and waste products that are of no use and then converting them back to the same new products. Since we are saving resources and are sending less trash to the landfills, it helps in reducing air and water pollution.

# **Recycling in Saudi Arabia**

The total waste generated in KSA is approximately 15 million tons per year which is effectively harm the environment.

# Recycling in Saudi Arabia

A photograph of a recycling facility. In the foreground, a worker wearing an orange high-visibility suit and a matching hard hat stands with their back to the camera, looking towards a large pile of waste. The waste consists of various plastic bottles and other debris. In the background, a conveyor belt system is visible, with a large pile of waste being processed. The facility has a high ceiling with industrial lighting and structural beams.

only 10% of  
recyclable  
materials

90% of  
materials are  
disposed by  
landfill

Based on article by the CEO of Saudi SIRC company

# What dose Raskala mean?

Raskala is a name derived from the term Recycling.

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RASKALA



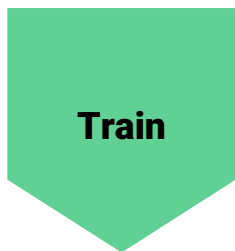


## Project Goal

To increase the recycling rate using deep learning to build an automatic classification system for the waste item.

# Data Description

Data provided by GitHub, it divided into six classes: glass, paper, cardboard, plastic, metal, and trash.



**Train**

**50%**



**Validation**

**25%**



**Test**

**25%**



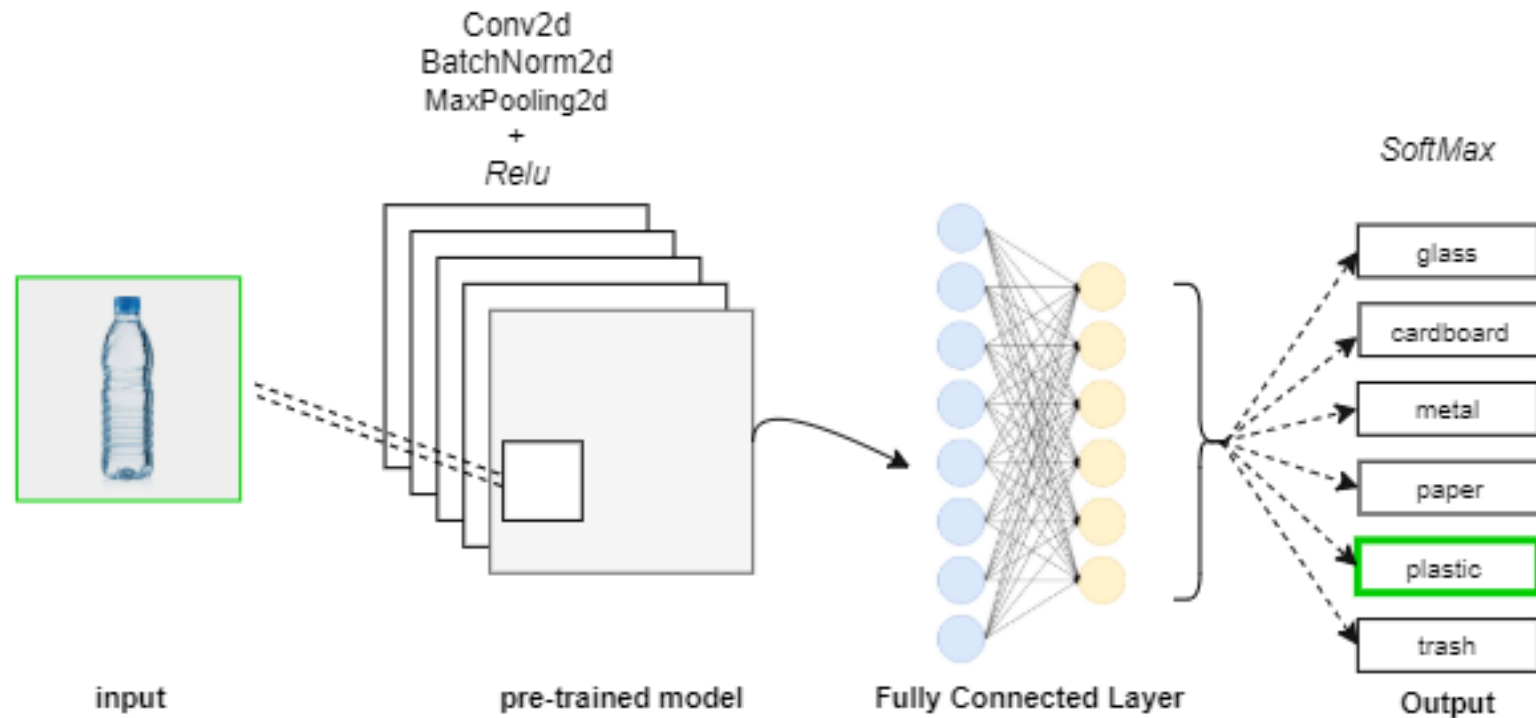
# Experiments

Using Fastai (built on top of PyTorch) to build CNN model.

	Train Accuracy	Test Accuracy
ResNet18	93%	91%
ResNet34	93%	93%

# ResNet34

Best Model



# Prediction Results

The model seems to have confused cardboard for paper and glass for plastic

Prediction/Actual/Loss/Probability

paper/cardboard / 9.40 / 0.00



metal/glass / 6.96 / 0.00



paper/plastic / 6.59 / 0.00



paper/plastic / 6.50 / 0.00



plastic/glass / 6.47 / 0.00



metal/plastic / 6.39 / 0.00



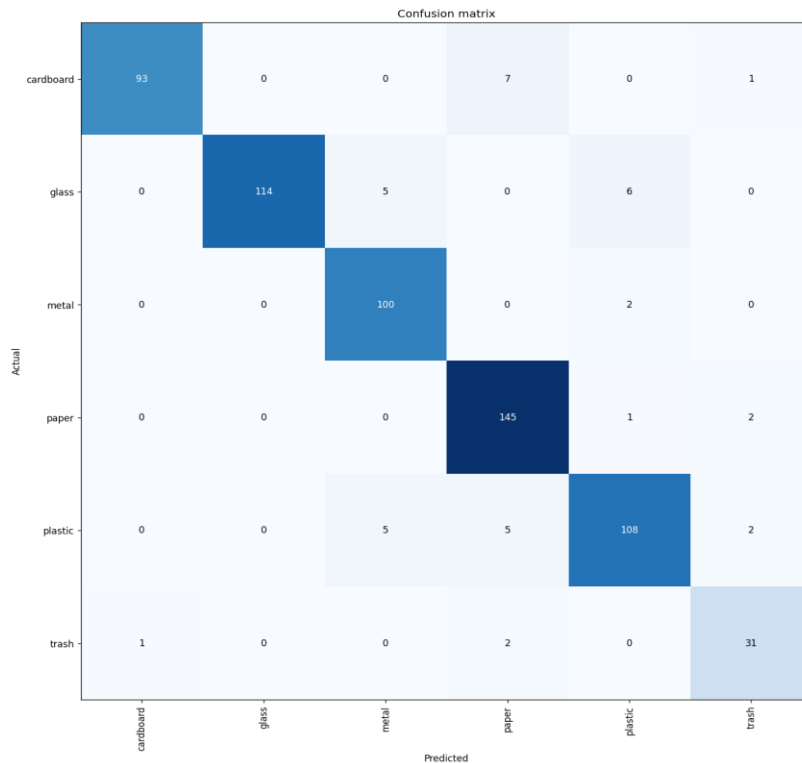
paper/trash / 5.74 / 0.00



trash/plastic / 5.32 / 0.00



metal/plastic / 5.05 / 0.01



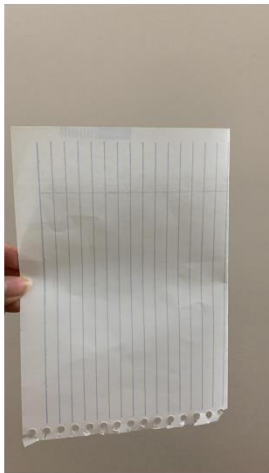
# Test Result

We test our model on real-world images.

trash



paper



plastic



metal



cardboard



# Deployment

Using Raspberry Pi

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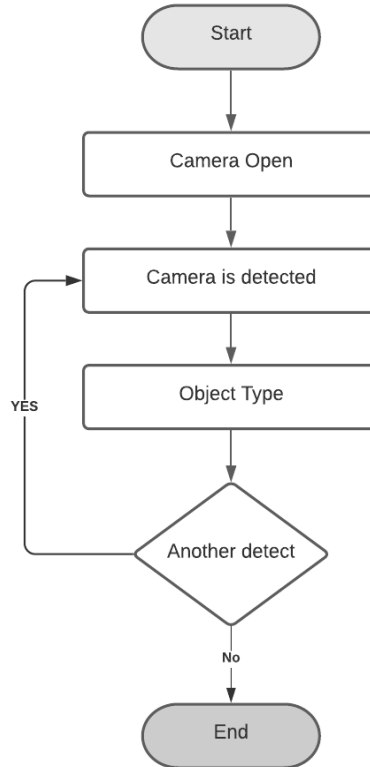


# Deployment

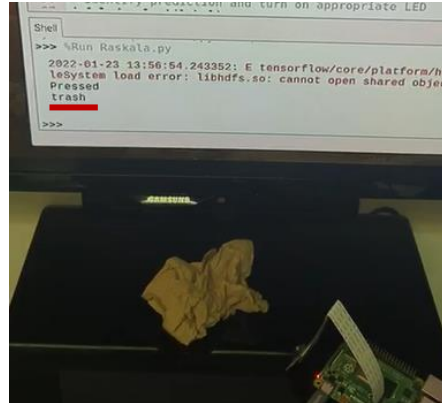
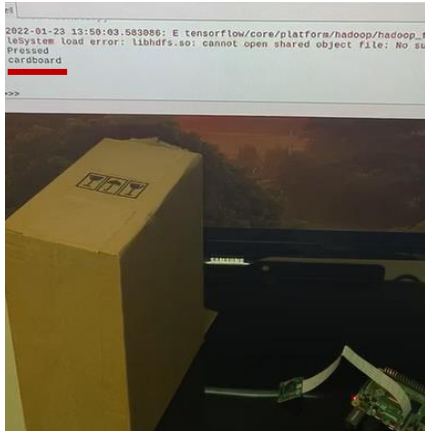
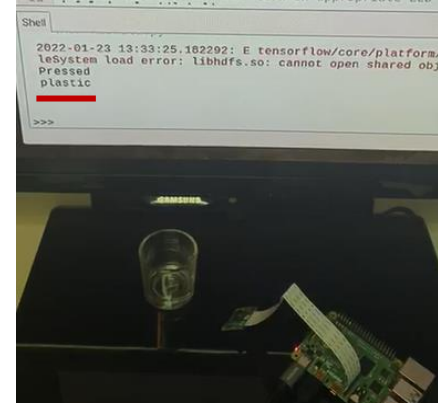
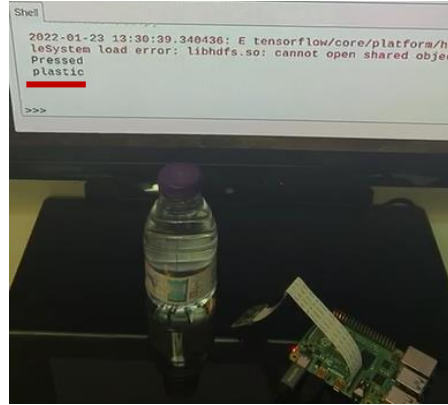
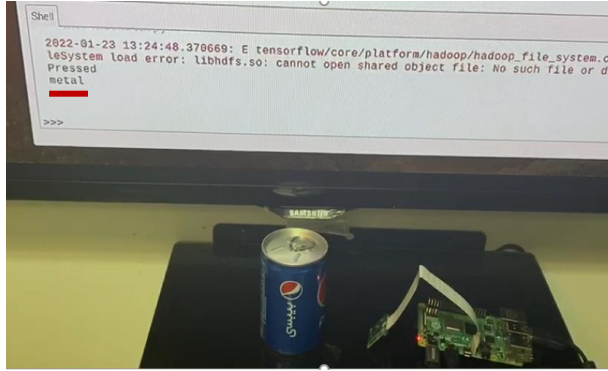
By using Raspberry Pi and Raspberry Pi camera V2 to detect type of trash.



# System Design (Flowchart)



# Raspberry Pi Predict Result



Did not predict glass correctly because accuracy of model not 100%





# Challenges

## **Challenges in general :**

- Lack of Data
- Huge project in limited time

## **Challenge in deployment (raspberry Pi):**

- issue with fastai versions in Raspberry Pi.
- system crush.
- One of the cameras stopped working because it sensitive.



# Feature Work

**1**

We want to increase accuracy  
and gathering more data to  
improve performance.

**2**

We want to send notification or  
email if the trash is full

**Thank you**