Abstract

<u>**College Name**</u>:   **MIT, Pune**

<u>**Team Details**</u>

Name	Member/Leader	Year(Second/Third/Final)
Dhananjay Uday Gavade	**Leader**	**Final**
Aditya Dinesh Bora	**Member**	**Final**
Sarvesh Milind Khire	**Member**	**Final**
Atharva Milind Nirali	**Member**	**Final**

<u>Problem Selection</u>: PWP

==Elaboration==

a. <u>*Understanding of the Problem*</u>

As per the current scenario, the severe issue of plastic garbage management persist. Although there have been bans imposed in some states, but the number of daily plastic garbage generated hasn't fallen. Per year India produces over 25000 tonnes of plastic waste. Our aim is to create a system that will help to generate statistics regarding every product's (that uses plastic material) plastic wastage and trace that back to the manufacturer. After research we have concluded that CNN classification model can be an effective solution to this problem. CNN Classification model can achieve a greater accuracy than using other computer vision algorithms.

b. <u>*Most Challenging aspect of the problem*</u>

Creation of app or even logical model is a simpler task compared to collection of right data and its filtration for training. One of the challenging issues is to trace the waste to the manufacturer and providing generated statistics. Another problem that there may be missing or unrecognizable branding over the commodity. Explicit commodity like Thermocol don't have any specific features to map them to a particular manufacturer needs to be categorized in separate segment.

c. <u>*Reason for Choosing this problem*</u>

We have selected this problem as we think that our solution can solve this issue. This solution convey to the manufacturers about available plastic waste in the society and in turn provocating them to think about managing the waste.
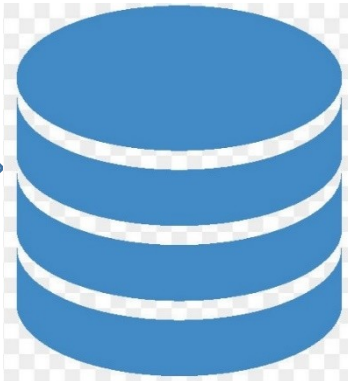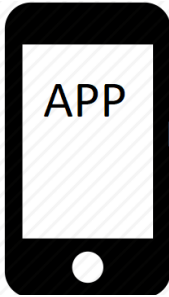
a. **Approach**

Our goal is to create a citizen friendly mobile application that will help citizen to take photo of plastic wastes. Photo taken will be stored with the location in our database. The photos from database will used in processing to identify and profile the manufacturers.

For achieving this we will go in following stages:

1. Getting data for training and preprocessing of data: Our system uses neural networks for processing the photos. So we have to train the NN model with the dataset. Basically we are using CNN model RetinaNet. For training our model we first get the data (images of plastic waste).Now dividing data into classes (types of commodities e.g.: bottles, wrappers). Now dividing into training set and testing set.

2. Training RetinaNet model on dataset. This model will classify images based on different commodities.
   This will help in finding the category of the waste product. This makes it easy for the next step that finds the manufacturers as it limits the permutations.

3. Next step is training CNN model on images of different manufacturer's products (Coca Cola, Pepsi, Kurkure, Lays, etc.). After this model will predict the manufacturer's identification from the photo.

4. The data obtained from the model will be stored in our database. After certain timespan the system will generate a report. This report will be useful in tracing the company.
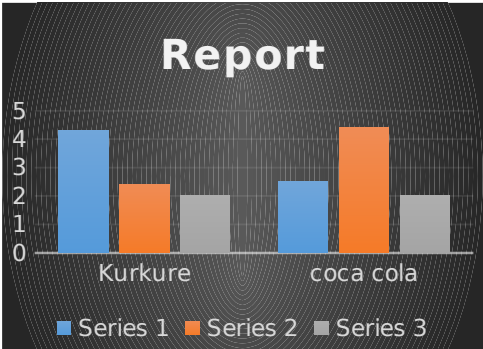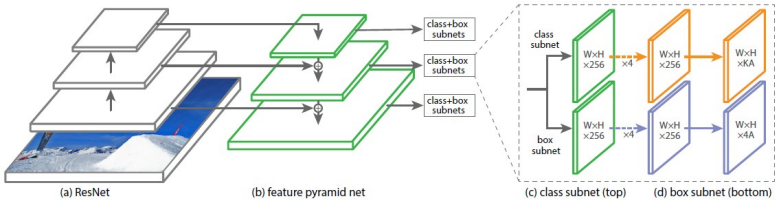
Approach Diagram if possible

Garbage Photo with

APP

Database

RetinaNet (To identify type eg: plastic, bottle etc.)

class+box subnets		
class+box subnets		
class+box subnets		

class subnet

W×H ×256   ×4   W×H ×256   W×H ×KA

box subnet   W×H ×256   ×4   W×H ×256   W×H ×4A

(a) ResNet   (b) feature pyramid net   (c) class subnet (top)   (d) box subnet (bottom)

Report

Kurkure   coca cola

■ Series 1 ■ Series 2 ■ Series 3

b. Platform/Coding Language/Framework

- Python (>3) for backend processing (NN models)
- Keras built on TensorFlow backend
- OpenCV for image preprocessing
- Android
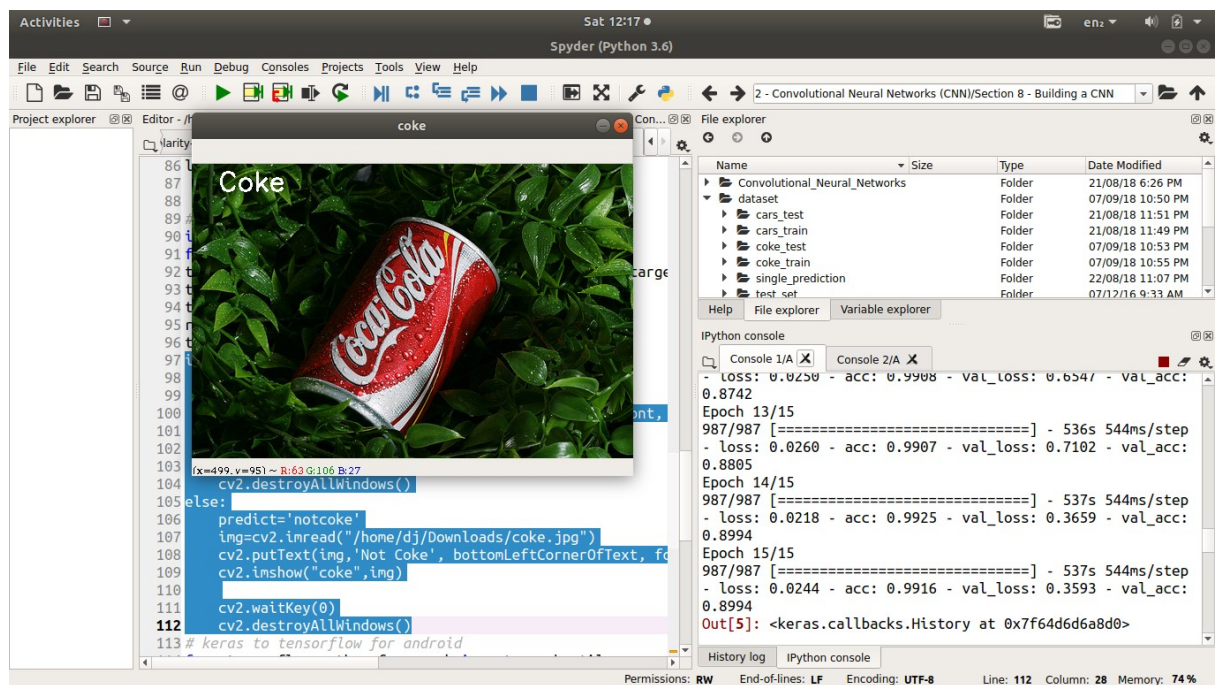- Other python libraries(Numpy, scikitlearn, matplotlib)

c. Database

- NoSQL database (much easier storing and retrieving data)

d. External Tools

- Anaconda (spyder)
- Android Studio
- mongoDB

This is an output of a model that we had implemented related to our project.

a. *Previous Projects Undertaken*

1. Automated Toll Payment System with etoll app
2. Smart Parking System
3. Medicine and Doctor Availability Prediction

b. *Team Strengths*

1. Worked on automation, image processing and android app development projects
2. Have few experience in developing projects for different hackathons and project completions

c. Team Achievements

1. Winner of Smart India Hackathon 2019 [Ministry of Human Welfare Association Varanasi]

2. 2nd in Smart India Hackathon 2017 [Road and Transport Ministry]
3. Won prize in Ezest Pune Hackathon 2017
4. In top 10 of Smart India Hackathon 2018