A PROJECT REPORT

ON

"GARBAGE PROFILING SYSTEM"

Submitted to

UNIVERSITY OF MUMBAI

In Partial Fulfilment of the Requirement for the Award of

BACHELOR'S DEGREE IN
COMPUTER ENGINEERING

BY

MOMIN FAIZAN HAROON	**17CO24**
KHAN WASIULLAH	**16CO32**
SHAIKH MOHAMMED SAIF	**16CO53**
SHAIKH MOHAMMED FAISAL	**15DCO70**

UNDER THE GUIDANCE OF
PROF. Kalpana bodke

DEPARTMENT OF COMPUTER ENGINEERING
Anjuman-I-Islam's Kalsekar Technical Campus
SCHOOL OF ENGINEERING & TECHNOLOGY
Plot No. 2 , Sector - 16, Near Thana Naka,
Khandagaon, New Panvel-410206

2020-2021

AFFILIATED TO

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CERTIFICATE

This is certify that the project entitled

"GARBAGE PROFILING SYSTEM"

submitted by

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is a record of bonafide work carried out by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Computer Engineering) at ***Anjuman-I-Islam's Kalsekar Technical Campus, Navi Mumbai*** under the University of MUMBAI. This work is done during year 2020-2021, under our guidance.

Date: / /

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Project Supervisor

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Director

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I would like to take the opportunity to express my sincere thanks to my guide **Ameer sayeed**, Assistant Professor, Department of Computer Engineering, AIKTC, School of Engineering, Panvel for his invaluable support and guidance throughout my project research work. Without his kind guidance & support this was not possible.

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At last we must express our sincere heartfelt gratitude to all the staff members of Computer Engineering Department who helped me directly or indirectly during this course of work.

MOMIN FAIZAN HAROON
KHAN WASIULLAH
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Project I Approval for Bachelor of Engineering

This project entitled ***Ïroject Title¨*** by ***Students Name*** is approved for the degree of ***Bachelor of Engineering in Department of Computer Engineering.***

Examiners

1. .....
2. .....

Supervisors

1. .....
2. .....

Chairman

.....

Declaration

I declare that this written submission represents my ideas in my own words and where others ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Student Name
Roll Number:

ABSTRACT

Building an image classifier We'll train a convolutional neural network to classify an image as either cardboard, glass, metal, paper, plastic, or trash with the Tensorflow library.

Recycling contamination occurs when waste is incorrectly disposed of — like recycling a pizza box with oil on it (compost). Or when waste is correctly disposed of but incorrectly prepared — like recycling UN rinsed jam jars. it becomes very difficult to recycle the waste the same goes to metals like iron , copper , aluminum etc.and e-waste like mobiles , computers and circuits if we somehow manage to profile them in write time then we can easily recycle them and also sell to any recycling industries.

Keywords: Image Classification, Garbage Profiling

Contents

List of Figures

List of Tables

Chapter 1

Introduction

write here

1.1 Purpose

Identify the product whose software requirements are specified in this document. Describe the scope of the product that is covered by this SRS, particularly if this SRS describes only part of the system or a single subsystem.Describe the different types of user that the document is intended for, such as developers, project managers, marketing staff, users, testers, and documentation writers.[3] Describe what the rest of this SRS contains and how it is organized. Suggest a sequence for reading the document, beginning with the overview sections and proceeding through the sections that are most pertinent to each reader type.

1.2 Project Scope

Recycling contamination occurs when waste is incorrectly disposed of — like recycling a pizza box with oil on it (compost). Or when waste is correctly disposed of but incorrectly prepared — like recycling UN rinsed jam jars. it becomes very difficult to recycle the waste the same goes to metals like iron , copper , aluminum etc. and e-waste like mobiles , computers and circuits if we somehow manage to profile them in write time then we can easily recycle them and also sell to any recycling industries.[**?**]

1.3 Project Goals and Objectives

1.3.1 Goals

1. Building an image classifier We'll train a convolutional neural network to classify an image as either cardboard, glass, metal, paper, plastic, or trash with the Tensorflow library .

Our modeling pipeline: 1. Organize the images into different folders 2. Train model 3. Make and evaluate test predictions

1.3.2 Organize images into different folders

We split images up into train, validation, and test image folders with a 50–25–25 split. Next, We to create a bunch of destination folders according to the Image Net directory convention. This means it will have an outer folder (we called it data) with three subfolders: train, validation, and test. Within each of those folders, there is a folder named cardboard, glass, metal, paper, plastic, and trash.

1.3.3 Objectives

1.3.4 What is resnet34?

A residual neural network is a convolutional neural network (CNN) with lots of layers. In particular, resnet34 is a CNN with 34 layers that's been pretrained on the ImageNet database. A pretrained CNN will perform better on new image classification tasks because it has already learned some visual features and can transfer that knowledge over (hence transfer learning).

1.3.5 Finding a learning rate

We find a learning rate for gradient descent to make sure that my neural network converges reasonably quickly without missing the optimal error

1.3.6 Image Classification:-

Image classification is a complex procedure which relies on different components. Here, some of the presented strategies, issues and additional prospects of image orders are addressed. The primary spotlight will be on cutting edge classification methods which are utilized for enhancing characterization precision. Moreover, some essential issues, identifying with grouping execution are additionally

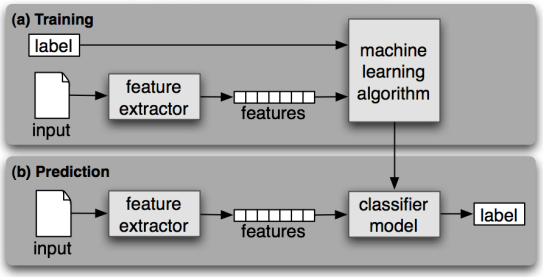


Figure 1.1: image classification

Chapter 2

Literature Survey

2.1 Literature review: - Waste Profiling and Analysis using Machine Learning

Keywords—Computer vision, Image processing, Correlation coefficient, Automatic systems, Robotic.

Aim:- To presents a system to classify waste in an automatic way as an application of computer vision. To understand the topics in technology are modified according to an application of computer vision that classifies waste in three stages

Description:- The first one corresponds to the image acquisition system, the second one is the image processing module, and the third one is the robotic classification module. The system developed classifies three kinds of waste with a performance over 70 percent, which indicates that the system could be used in classification process.

Module 1: Image acquisition Image acquisition Image acquisition system was developed into the light visible spectrum. a white light source based in Led. the acquisition system captured images with irrelevant zones. This represents computation of data that are not needed. Thus, a 'ROI' was selected from the webcam images, considering the zone that contains the waste.

Module 2: Image processing This module receives the image captured the above process, after that, the algorithm of this module computes the image until it produces a label that places it into a kind of waste. Finally, the label generates a signal that communicates with the third module. The algorithm was developed in Matlab software

Module 3: Robotic classification This module transforms the electrical signal produced by the image processing module, into mechanical actions that indicates the

place to deposit the evaluated waste

2.1.1 Advantages of Paper

a. This application besides classifying an object, it can be useful as a motivation technique for students that are close to start university studies, and want to explore the computer vision as an investigation field.

b. Process in a simpler and faster way: it allows the clients and industries to check. Also, it gives them access to their products. It's possible thanks to the existence of Computer Vision in fast computers.

2.1.2 Disadvantages of Paper

a. Initial cost is high depending upon the system used.

b. Once the system is damaged the image will be lost

c. The system developed classifies three kinds of waste with a performance over 70 percent

2.1.3 How to overcome the problems mentioned in Paper

a. The image can be augmented to reduce cost

b. Same image can be rotated to increase the size of dataset

2.2 Literature review: - Recent scenario of Solid Waste Management in India

Keywords—Municipal Solid WasteWaste generation;Collection;Segregation;3R Concept,Treatment,Disposal,Landfilling.

Aim:-This study describes about a collective systematic effort which improves implementation of legal frameworks, institutional arrangements, financial provisions, technology, operations management, human resource development, and public participation and aware ness of Integrated SWM system.

Description:- The paper is based on the policies and rules imposed for solid waste management by Government. It includes collection,segregation,decomposition and recycling of waste generated or produced by factories,household etc .

It gives a brief knowledge about Composition of Municipal Solid Waste in different states and regional areas where South India is the most compostable region and the lowest compostable region is West India. The types of Solid waste is classified into residential,industrial,commercial,construction,municipal,agriculture and mining.

2.2.1 Advantages of Paper

a. Implementation of improving Solid Waste Management by Government increased with the help of local authorities.

b. Increasing public awareness (Swacch Bharat Abhiyan).

2.2.2 Disadvantages of Paper

a. It seems that policy framework is available only on paper,but ground reality is alarming one

b. There various initiative to improve Solid Waste Management, but still lacking to achieve the objectives.

c. 80-90 percent of total budget is being spent on collection and transportation.

2.3 ta Analytics approach to create waste generation profiles for waste management and collection.

1 In this study we consider the waste monitoring data as series of measured waste quantity (kg) in certain time points and geographical locations.

2 In first stage, the raw monitoring data have to be processed to a format required by data analytics methods.

3 Waste Quantity, waste generation can be expressed in terms of conditions of continuous time-series depending on sample resolution.

4. The cluster analysis and resulting type profiles can be used, for Instances:-
a) To compare waste producers in terms of waste generation.
b) To identify anomalies, exceptional behavior in waste generation.
c) To estimate waste generation at new sites and areas.

5. There are two main machine learning algorithms which is used in these system is self-organizing map and k-means algorithm.

2.3.1 Advantages of Paper

a. The analytics is useful to produce useful information on waste generation in spatiotemporal scales for the basis of monitoring and implementing feasible waste management policies and operations in households, real estate and utility levels.

b. It benefits for identifying complex, nonlinear waste generation pattern from the extensive waste monitoring data.

c. Useful for implementation of efficient waste management operation.

2.3.2 Disadvantages of Paper

a. Detailed analysis of factors behind the identified waste generation is out of scope in this proposed system.

b. The analytics is more suitable for household waste etc. which makes it biased.

c. Moderate data protection and privacy issues are less concerned.

2.3.3 How to overcome the problems mentioned in Paper

a. Use of city waste collection services by the public and private sectors.

b. Funding for waste management from local elected officials.

c. Adoption and enforcement of local waste management policies. Support for local-level activities from national or provincial governments.

Chapter 3

Project Planning

3.1 Members and Capabilities

Table 3.1: Table of Capabilities

SR. No	Name of Member	Capabilities
1	Khan wasiullah	Research and UI
2	shaikh mohammed faisal	database and UI
3	shaikh mohammed saif	Frontend and Research
4	Momin Faizan Haroon	Backend and Ml

3.2 Roles and Responsibilities

Table 3.2: Table of Responsibilities

SR. No	Name of Member	Role	Responsibilities
1 shaikh mohammed saif	coordinator	Frontend Developer	
2 shaikh mohammed faisa	System architecture	Database	
3 Khan wasiullah	Researcher	Research	
4 Momin Faizn Haroon	Coordinator	Backend Developer	

3.3 Assumptions and Constraints

3.3.1 Assumptions

1 Each Member has completed their part of project with at best of their capability. 2 The updates of project will be given timely .

3.3.2 Constraints

1 Late Updates may happen due to technical or personal issue .

3.4 Project Management Approach

The Project Management Approach is Waterfall

3.5 Project Timeline

The timeline for project is 3 month

Chapter 4

Software Requirements Specification

4.1 Overall Description

4.1.1 Product Perspective

The Product is digitise version of existing garbage profiling system, this system uses tensorflow framewor for image classification of image. Describe the context and origin of the product being specified in this SRS. For example, state whether this product is a follow-on member of a product family, a replacement for certain existing systems, or a new, self-contained product. If the SRS defines a component of a larger system, relate the requirements of the larger system to the functionality of this software and identify interfaces between the two. A simple diagram that shows the major components of the overall system, subsystem interconnections, and external interfaces can be helpful[3].

4.1.2 Product Features

1 Image Classification
2 maintaining Streak
3 Reward and Fine Feature

4.1.3 User Classes and Characteristics

There are two type of user classes Generator and Handler.
1 The Generator can view fine, reward,and streak.
2 The generator can also pay fine using reward or online banking
3 The Handler has to click a photo which is the process by ml algorithm .

4.1.4 Operating Environment

The website can work on any browser and on any devices.

4.2 External Interface Requirements

4.2.1 User Interfaces

The user interface is divided into two section generator and handler

In Handler Section the handler will click an image which will then be categorised in one of six category by ml algorithm and accordingly update reward , fine , streak .

In Generator section the generators will be able to view their streak , fines and rewards , the generators can pay their fine or use the reward amount .

4.2.2 Hardware Interfaces

website can be used in any digital device such as mobile or laptop.

4.2.3 Software Interfaces

1 The programming language used for website back end development is python 3.6.
2 The programming language used for website front end development is CSS, Bootstrap and markup language HTML .
3 Dajngo framework is a website development framework built on top of python (version 3.5)
4 Dajngo framework come with default SQL database server for developers which can be changed to mysql , mongodb etc.
5 The libraries use for machine algorithm engineering are tensorflow(version 2.0) , keras (version 2.3.1) , numpy(version 1.19.0) , matplotlib (version 3.11) .

4.3 Nonfunctional Requirements

4.3.1 Safety Requirements

1 Never Share loginID and Password with any one .
2 Do not share any personal information on website unless asked for.

4.3.2 Security Requirements

1 All user must register themselves with respect to their role.
2 User will be provided with username and password which is require for login .

Chapter 5

System Design

5.1 System Requirements Definition

In this module the data that is retrieved for Profiling, The main aim of Data Cleaning is to identify and remove errors duplicate data, in order to create a reliable data-set. This improves the quality of the training data for analytic and enables accurate decision-making.

5.1.1 Functional requirements

In this module we are going to implement the machine learning, we are going to train the given data set using our algorithm and then extract the knowledge. the extracted knowledge will be converted into certain file format such as JSON. The elements of module are explained below:

5.1.2 Data Preprocessing

It is a technique that is used to convert the raw data into a clean data set. In other words, whenever the data is gathered from different sources it is collected in raw format which is not feasible for the analysis.

5.1.3 Training data set

It is the one used to train an algorithm to understand how to apply concepts such as neural networks, to learn and produce results. It includes both input data and the expected output

5.1.4 Test data set

It is used to evaluate how well your algorithm was trained with the training data set. In AI projects, we can't use the training data set in the testing stage because the algorithm will already know in advance the expected output which is not our goal.

5.1.5 Machine Learning algorithm

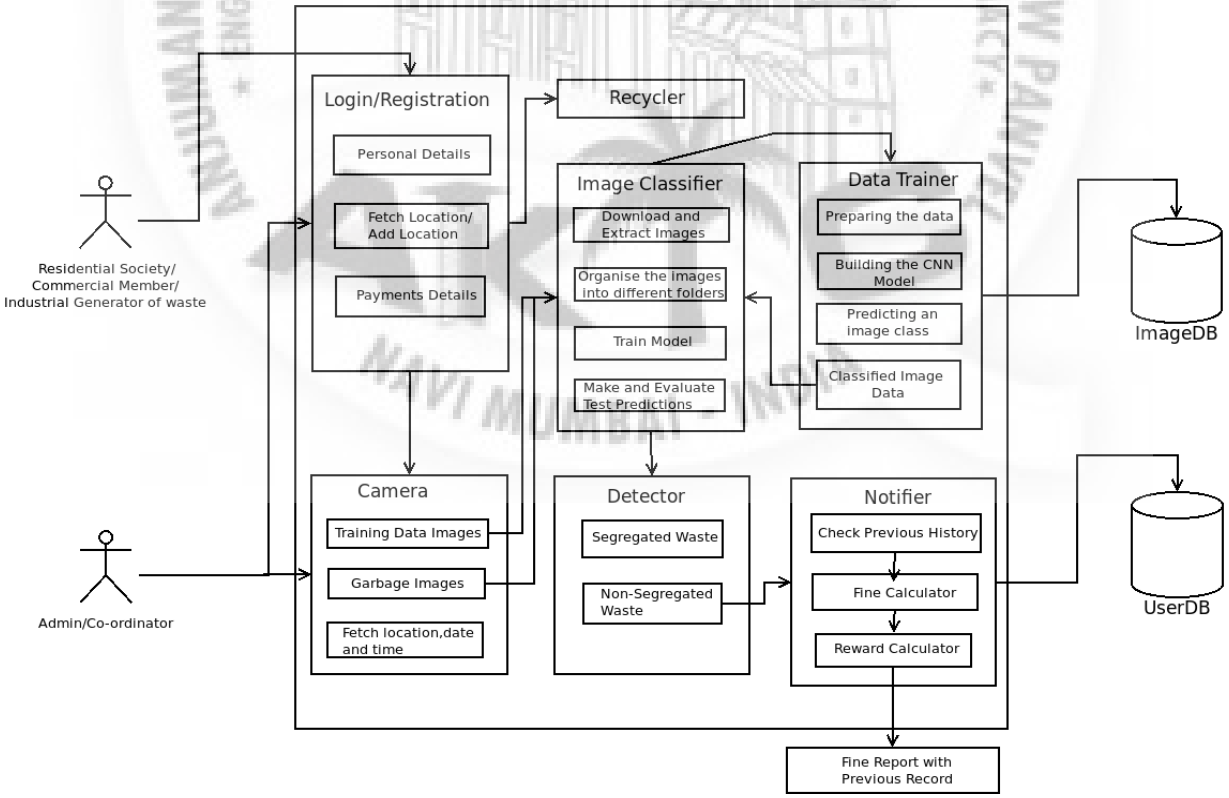
Machine learning algorithms are programs (math and logic) that adjust themselves to perform better as they are exposed to more data. The "learning" part of machine learning means that those programs change how they process data over time, much as humans change how they process data by learning.

5.1.6 Knowledge extraction

Machine learning deals with understanding intelligence for the design and development of algorithms that can learn from data and improve over time. The original definition was "the artificial generation of knowledge from experience". The challenge is to discover relevant structural patterns and/or temporal patterns ("knowledge") in such data.

5.2 System Architecture Design

WRITE HERE.



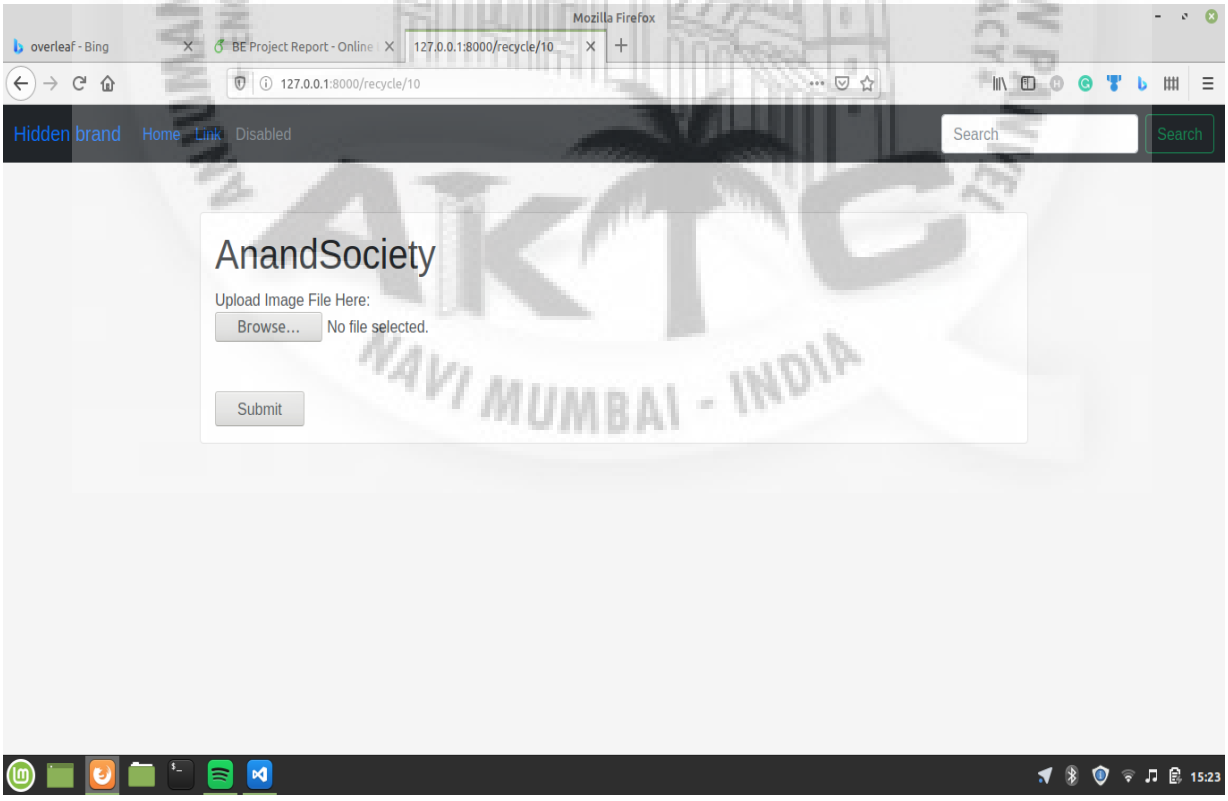
Chapter 6

Implementation

6.1 Image classification algorithm

The image classification algorithm uses tensorflow framework, which was created by google. It uses libraries such as numpy matplotlib, keras .

The algorithm was trained with 5000 images, The size as dataset was increased by using process image augmentation(flipping image ,rotating image right etc).




```
#Import for Ml Model
import json
```

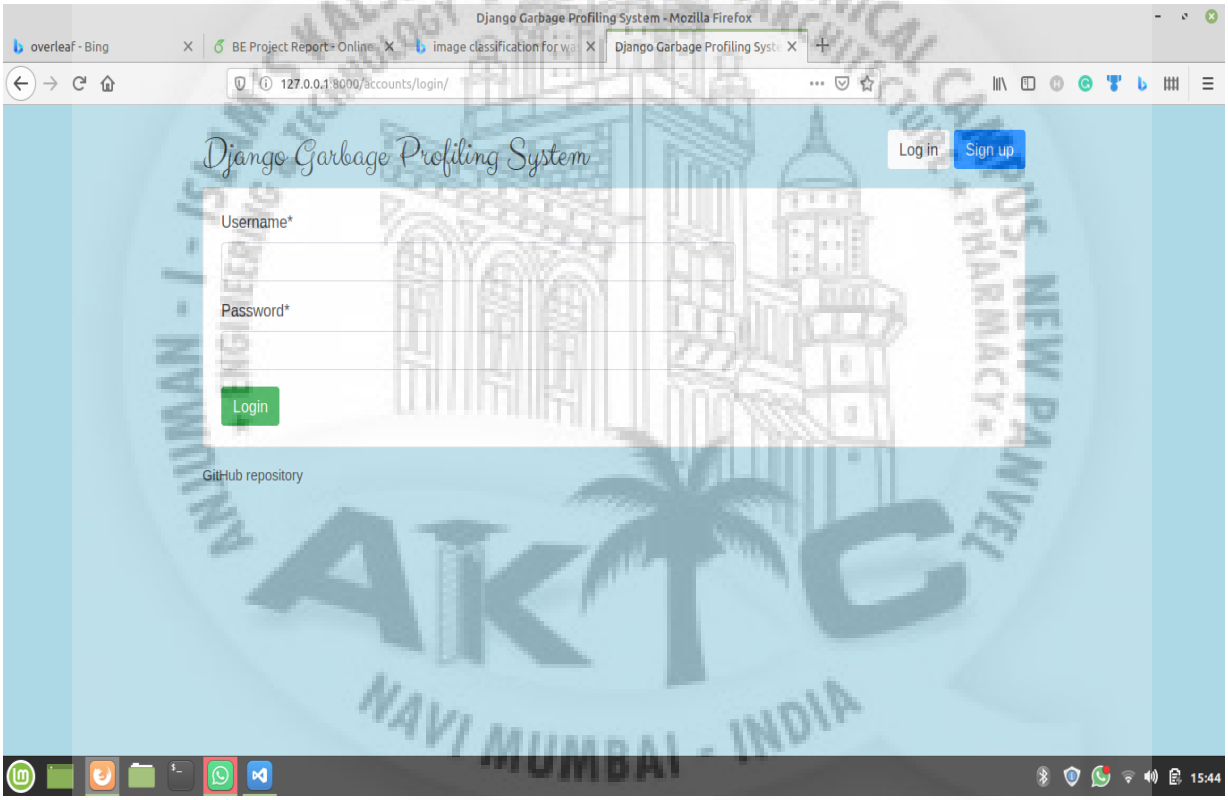
```
from django.shortcuts import render,redirect
from django.core.files.storage import FileSystemStorage
from django.contrib.auth.decorators import login_required
import matplotlib.pyplot as plt
import numpy as np
import os
import PIL
from django.views.decorators.csrf import csrf_exempt,csrf_protect #Add this
import tensorflow as tf
import zipfile as zf
import pathlib
from tensorflow import keras
from tensorflow.keras import layers
from tensorflow.keras.models import Sequential
from keras.initializers import glorot_uniform
from accounts.models import Generator

#Imports of Recycle
from django.views.generic import ListView,DetailView
#from Mlmodel.models import Recycle,Decompose
from accounts.views import User



#Reading the model from JSON file
with open('/home/lenovo/Desktop/python/test.json', 'r') as json_file:
    json_savedModel= json_file.read()
#load the model architecture
model_j = tf.keras.models.model_from_json(json_savedModel)
labelInfo=json.loads(json_savedModel)
#model_j.summary()
model_j.load_weights('/home/lenovo/Desktop/python/test1.h5')


import pathlib
data_dir = pathlib.Path("/home/lenovo/Desktop/python/dataset-resized/dataset-
    resized")
batch_size = 32
img_height = 180
img_width = 180


train_ds = tf.keras.preprocessing.image_dataset_from_directory(
  data_dir,
  validation_split=0.2,
  subset="training",
  seed=123,
  image_size=(img_height, img_width),
  batch_size=batch_size)



val_ds = tf.keras.preprocessing.image_dataset_from_directory(
  data_dir,
  validation_split=0.2,
  subset="validation",
  seed=123,
  image_size=(img_height, img_width),
  batch_size=batch_size)


```

```
63
64
65 class_names = train_ds.class_names
66
67
68
69
70 # Create your views here.
71 def predictimage(request):
72
73     print(request)
74     file_object     = request.FILES['filePath'] if 'filePath' in request.FILES
           else False
75     fs              = FileSystemStorage()
76     filepathname    = fs.save(file_object.name,file_object)
77     filepathname    =   fs.url(filepathname)
78     context         = {'filepathname':filepathname}
79
80
81
82
83     image_path = '.'+filepathname
84     #sunflower_path = tf.keras.utils.get_file('Red_sunflower', origin=
           sunflower_url)
85
86     img = keras.preprocessing.image.load_img(
87     image_path, target_size=(img_height, img_width)
88     )
89     img_array = keras.preprocessing.image.img_to_array(img)
90     img_array = tf.expand_dims(img_array, 0) # Create a batch
91
92     predictions = model_j.predict(img_array)
93     score = tf.nn.softmax(predictions[0])
94
95     print(
96     "This image most likely belongs to {} with a {:.2f} percent confidence."
97     .format(class_names[np.argmax(score)], 100 * np.max(score))
98     )
99
100
101
102
103     return render(request,'handler.html',context)
```

6.2 Login and Registration

Users input their credentials on the website's login form. That information is then sent to the authentication server where the information is compared with all the user credentials on file. When a match is found, the system will authenticate users and grant them access to their accounts.

Django provide us with an easy to use authentication system ,the system is password based authentication. In registration process user need to provide necessary information such as (e-mail,phone,name ,username).




```
from django.contrib.auth import login, logout,authenticate
from django.shortcuts import redirect, render
from django.contrib import messages
from django.views.generic import CreateView
from django.views.decorators.csrf import csrf_exempt,csrf_protect #Add this
from accounts.forms import HandlerRegisterationForm, GeneratorRegisterationForm
from django.contrib.auth.forms import AuthenticationForm
from .models import User


class generator_register(CreateView):
    model = User
```

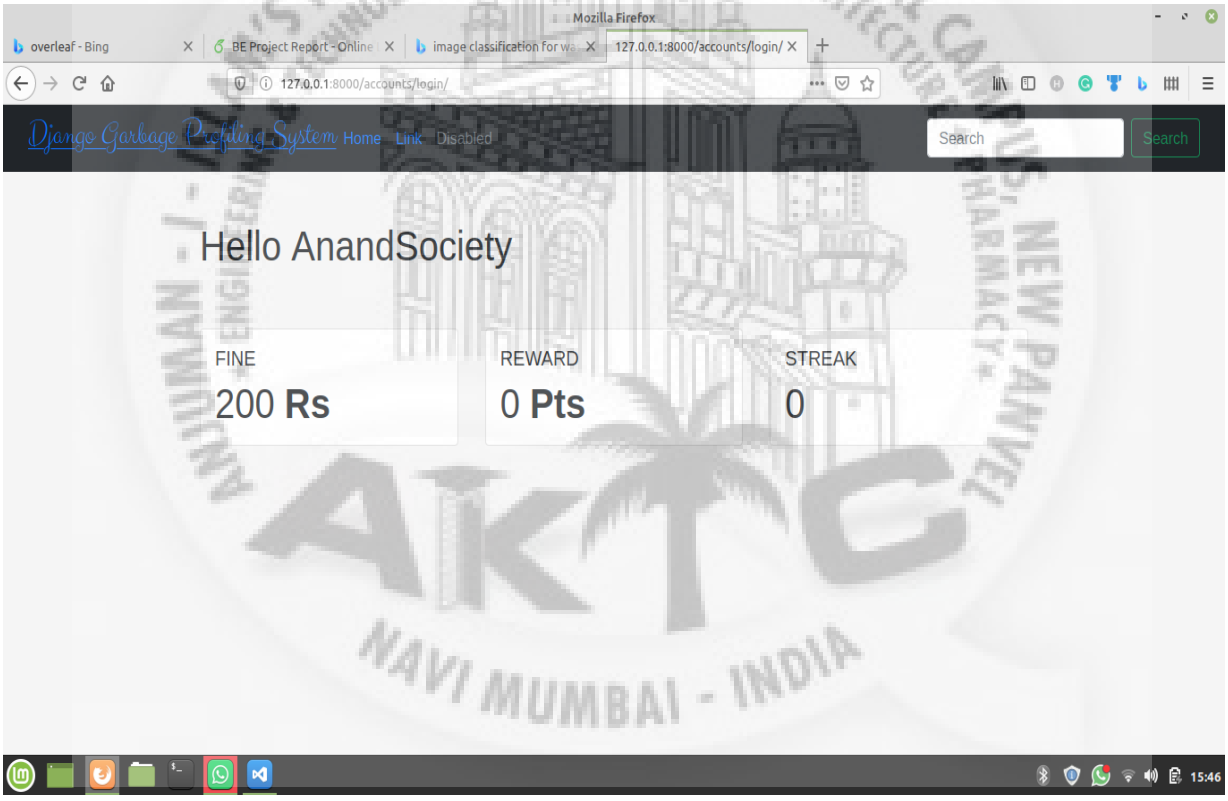
```
    form_class = GeneratorRegisterationForm
    template_name = '../templates/login.html'

    def form_valid(self, form):
        user = form.save()
        login(self.request, user)
        return redirect('index')

class handler_register(CreateView):
    model = User
    form_class = HandlerRegisterationForm
    template_name = '../templates/login.html'

    def form_valid(self, form):
        user = form.save()
        login(self.request, user)
        return redirect('index')
@csrf_protect
@csrf_exempt
def login_request(request):
    if request.method=='POST':
        form = AuthenticationForm(data=request.POST)
        if form.is_valid():
            username = form.cleaned_data.get('username')
            password = form.cleaned_data.get('password')
            user = authenticate(username=username, password=password)
            if user.is_generator  == True:
                if user is not None :
                    login(request,user)
                    return render(request, '../templates/generator.html')
                else:
                    messages.error(request,"Invalid username or password")
            if user.is_handler  == True:
                if user is not None :
                    login(request,user)
                    return render(request, '../templates/handler.html')
                else:
                    messages.error(request,"Invalid username or password")

        else:
            messages.error(request,"Invalid username or password")
    return render(request, '../templates/login.html',
    context={'form':AuthenticationForm()})

def logout_view(request):
    logout(request)
    return redirect('/')
```

6.3 Fine,Reward,Streak

Fine : If Image of decomposable waste is provided in recycle section then user will be fine amount X. If Image of decomposable waste is provided in decomposable section for 30 days then user will be rewarded amount X.

Reward: If Image of decomposable waste is provided in decomposable section for 30 days then user will be rewarded amount X.

Streak: If Image of decomposable waste is provided in decomposable section for 30 days then users streak will increment by 1 every time.



Chapter 7

System Testing

WRITE HERE.

7.1 Test Cases and Test Results

Test ID	Test Case Title	Test Condition	System Behavior	Expected Result
T01	Login and registration	Login using registered loginID and Password	successfully	Successfully Login and Registration
T02	Image Classification	Classify image into one of six categories	Successfully classified images	Image classifications
T03	Update Fine ,Reward , Streak on generators	None	Updated Fine not reward and streak	Update reward , fine , streak.

7.2 Sample of a Test Case

Title: Login Page – Authenticate Successfully on Login Page using registered loginID and Password
Description: A registered user should be able to successfully login at gmail.com.

Precondition: the user must already be registered with an email address and password.

Assumption: a supported browser is being used.

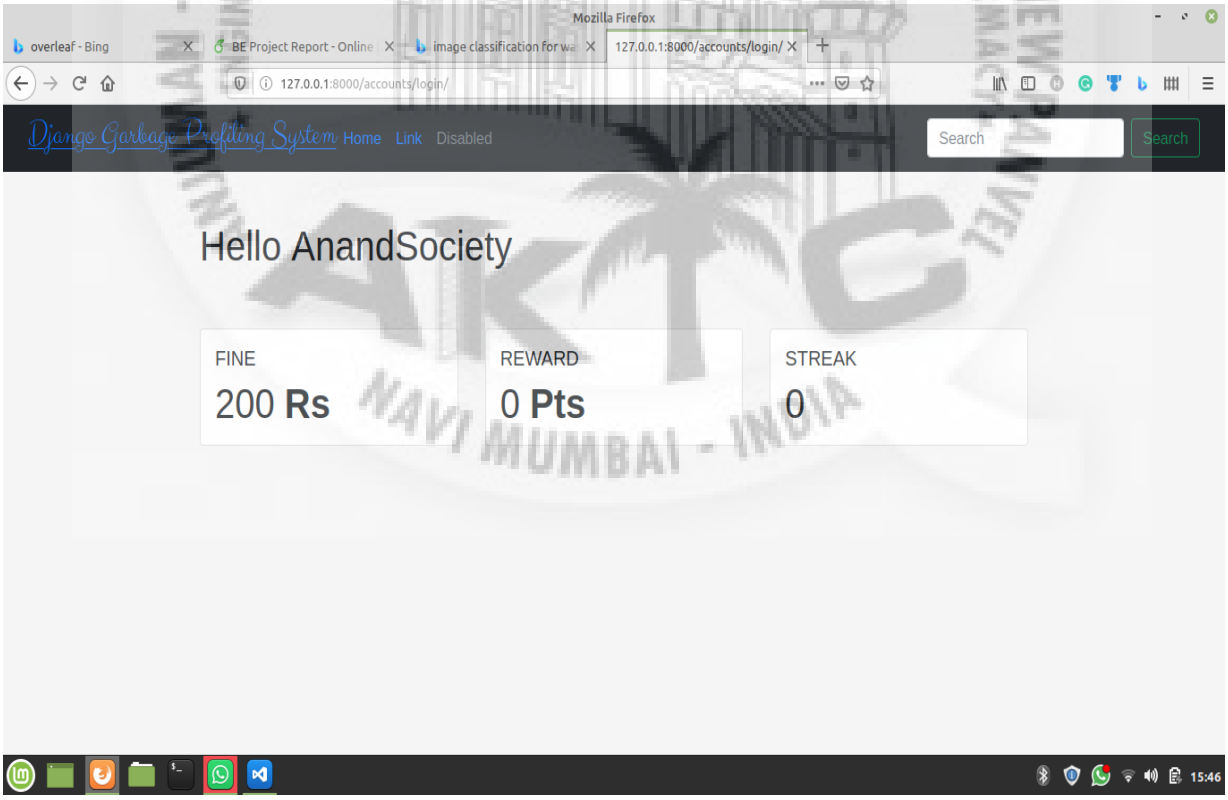
Test Steps:

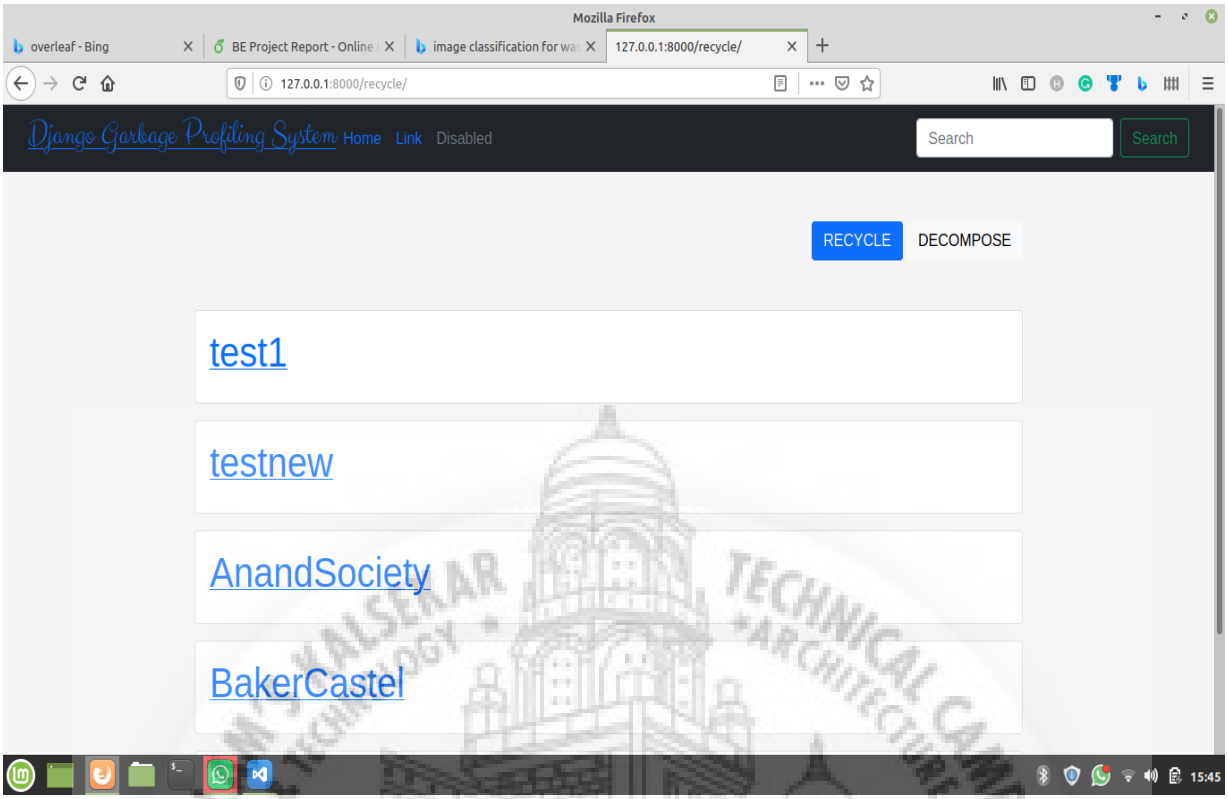
1. Navigate to Login Page

2. In the 'LoginID' field, enter the LoginID of the registered user.
3. Click the 'Next' button.
4. Enter the password of the registered user
5. Click 'Sign In'

Expected Result: Home page is appeared depending on weather user is handler or generator
Actual Result: Home page is appeared depending on weather user is handler or generator

The following is a screen shot of successful login of handler and generator.

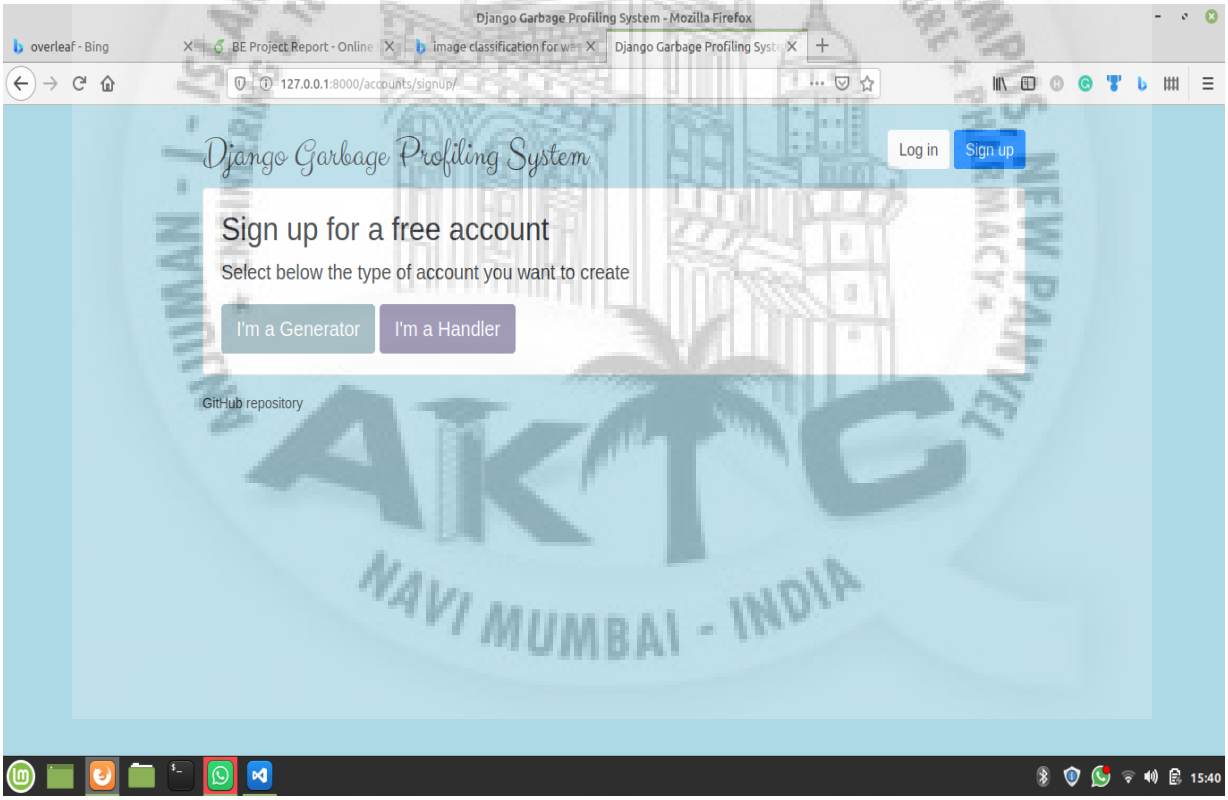



Mozilla Firefox
overleaf - Bing
BE Project Report - Online
image classification for wa
127.0.0.1:8000/recycle/
127.0.0.1:8000/recycle/
Django Garbage Profiling System
Home
Link
Disabled
Search
Search
RECYCLE
DECOMPOSE
test1
testnew
AnandSociety
BakerCastel
15:45

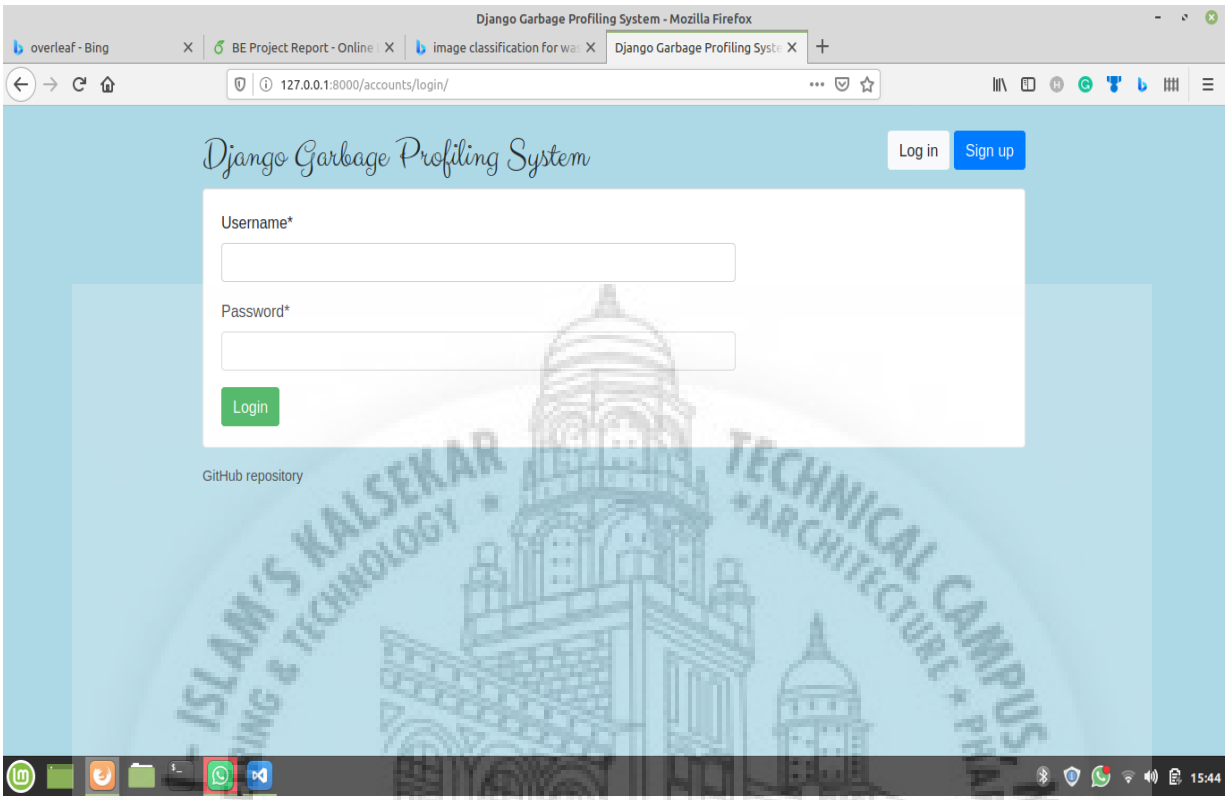
Chapter 8

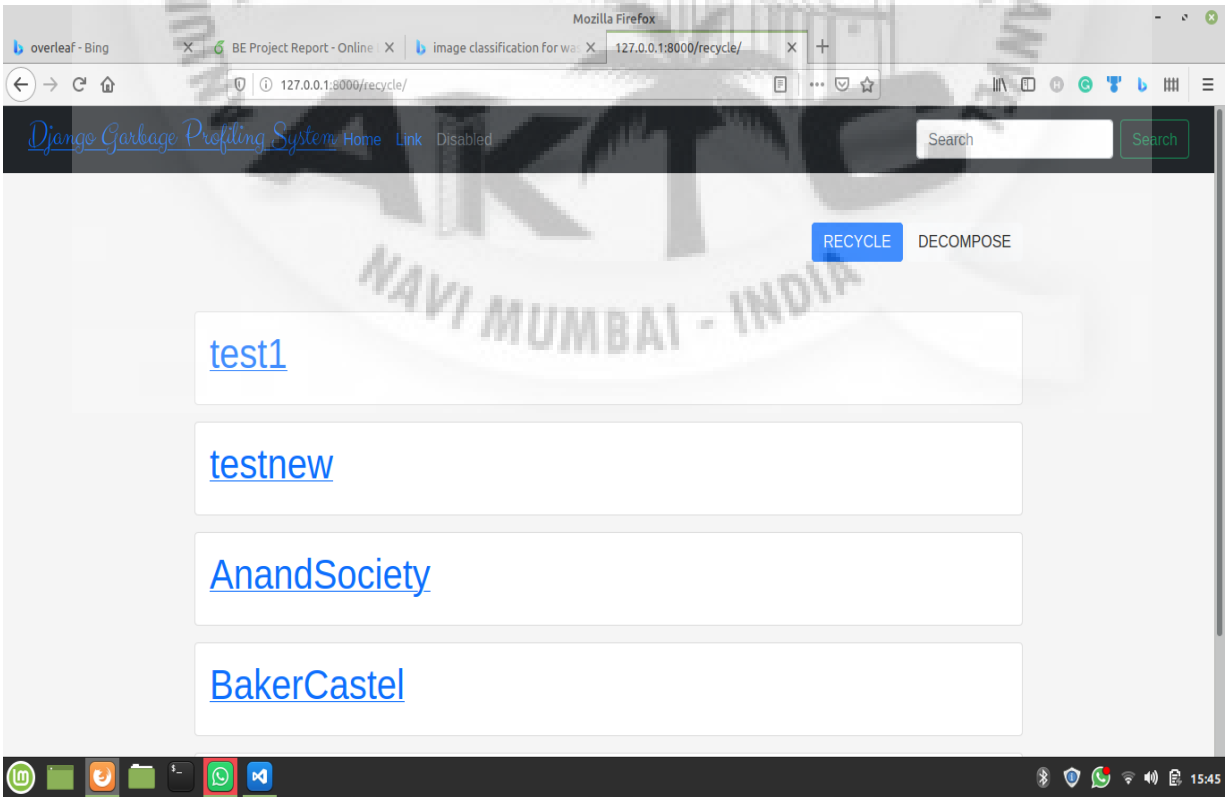
Screenshots of Project

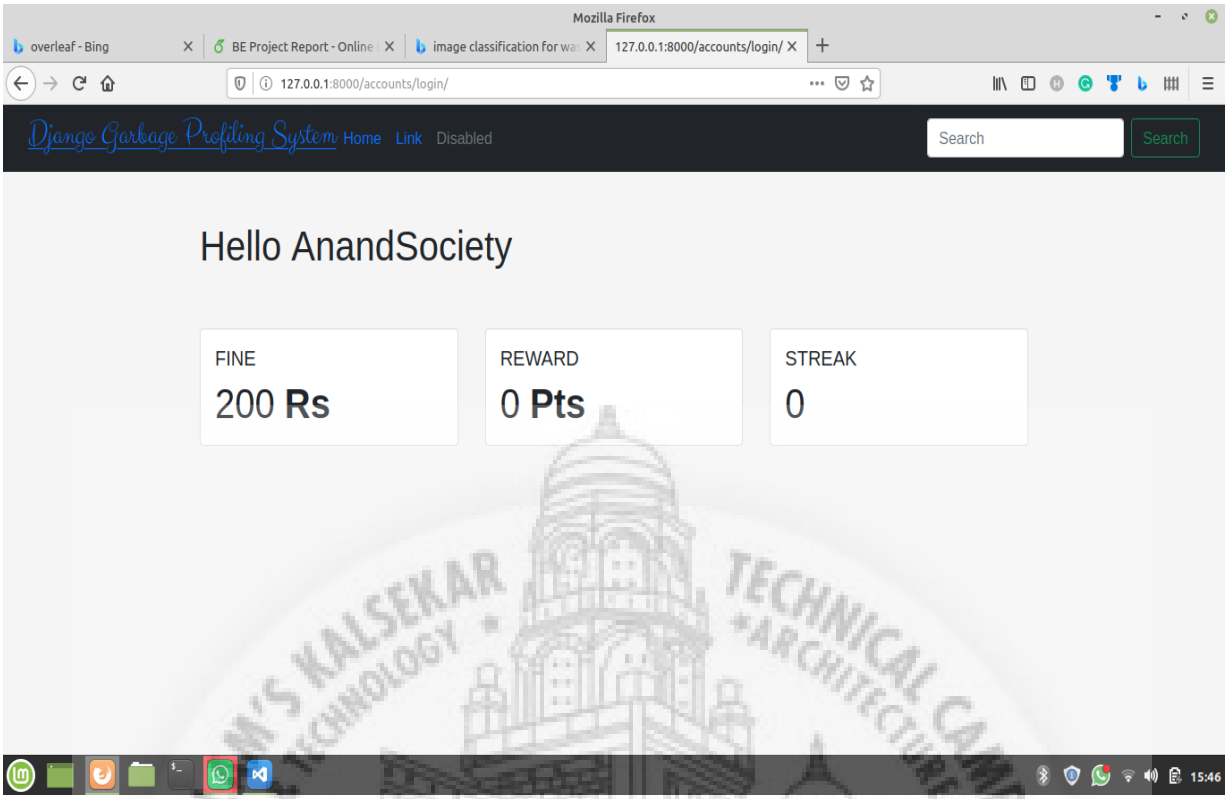
8.1 Login And Registration



8.2 Generator and Handler Home page






Mozilla Firefox
overleaf - Bing
BE Project Report - Online
image classification for wa
127.0.0.1:8000/accounts/login/
127.0.0.1:8000/accounts/login/
Django Garbage Profiling System
Home
Link
Disabled
Search
Search
Hello AnandSociety
FINE
200 Rs
REWARD
0 Pts
STREAK
0
15:46

Chapter 9

Conclusion and Future Scope

9.1 Conclusion

Hence We have Successfully design an image classifier, We'll train a convolutional neural network to classify an image as either cardboard, glass, metal, paper, plastic, or trash with the Tensor-flow library.

Which classify recyclable waste efficiently at its source and reduce cost compare to old procedures.

9.2 Future Scope

- Improve UI
- ADD Payment Method
- Developing the information and awareness about the recycling to decrease the waste .

References

[1] *Prediction of municipal solid waste generation by use of artificial neural networks* ; Jalili Ghazi Zade, M., Noori, R., 2008.

[2] *Object detection networks on convolutional feature maps* ; Ren, S., He, K., Girshick, R., Zhang, X., Sun, J., 2017.

[3] *Management of Bottom Ash from WTE Plants, ISWA-WG Thermal Treatment Subgroup Bottom Ash from WTE-Plants* ; ISWA 2006