

# **DIGITAL NATURALIST – AI ENABLED TOOLS FOR BIODIVERSITY RESEARCHERS**

**A PROJECT REPORT**

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## TABLE OF CONTENTS

| CHAPTER NO | TITLE  | PAGE NO |
|------------|--|---------|
| 1          | <b>INTRODUCTION</b><br>1.1 Project Overview<br>1.2 Purpose   | 1       |
| 2          | <b>LITERATURE SURVEY</b><br>2.1 Existing System<br>2.2 Reference<br>2.3 Problem Statement Definition   | 2       |
| 3          | <b>IDEATION &amp; PROPOSED SOLUTION</b><br>3.1 Empathy Map Canvas<br>3.2 Ideation & Brainstorming<br>3.3 Proposed Solution<br>3.4 Problem Solution Fit | 3       |
| 4          | <b>REQUIREMENT ANALYSIS</b><br>4.1 Functional Requirement<br>4.2 Non-Functional Requirement  | 7       |
| 5          | <b>PROJECT DESIGN</b><br>5.1 Data Flow Diagrams<br>5.2 Solution & Technical Architecture   | 9       |
| 6          | <b>PROJECT PLANNING &amp; SCHEDULING</b><br>6.1 Sprint Planning, Schedule Estimation<br>6.2 Sprint Delivery Schedule<br>6.3 Reports From JIRA          | 12      |
| 7          | <b>CODING &amp; SOLUTIONING</b><br>7.1 Feature   | 15      |
| 8          | <b>TESTING</b><br>8.1 Test cases<br>8.2 User Acceptance Testing  | 23      |

|           |  |    |
|-----------|--|----|
| <b>9</b>  | <b>RESULTS</b><br>9.1 Performance Metrics                                      | 25 |
| <b>10</b> | <b>ADVANTAGES &amp; DISADVANTAGES</b><br>10.1 Advantages<br>10.2 Disadvantages | 28 |
| <b>11</b> | <b>CONCLUSION</b>  | 29 |
| <b>12</b> | <b>FUTURE SCOPE</b>  | 29 |
| <b>13</b> | <b>APPENDIX</b>  | 30 |

# CHAPTER-1

## Introduction

### 1.1 Project Overview

A naturalist is someone who studies the patterns of nature, identifies a different kind of flora and fauna in nature. Being able to identify the flora and fauna around us often leads to an interest in protecting wild spaces, and collecting and sharing information about the species we see on our travels is very useful for conservation groups like NCC. When venturing into the woods, field naturalists usually rely on common approaches like always carrying a guidebook around everywhere or seeking help from experienced ornithologists. There should be a handy tool for them to capture, identify and share the beauty to the outside world. Field naturalists can only use this web app from anywhere to identify the birds, flowers, mammals and other species they see on their hikes, canoe trips and other excursions. In this project, we are creating a web application which uses a deep learning model, trained on different species of birds, flowers and mammals (2 subclasses in each for a quick understanding and get the prediction of the bird when an image is been given. We use artificial neural network to train the image and build a deep learning model. When venturing into the woods, field naturalists usually rely on common approaches like always carrying a guidebook around everywhere or seeking help from experienced ornithologists. There should be a handy tool for them to capture, identify and share the beauty to the outside world.

### 1.2 Purpose

The project aims to create an application for the hikers to identify rare species of birds, flowers, plants, marine animals, animals by giving a picture taken by them. Field naturalists can only use this web app from anywhere to identify the birds, flowers, plants, marine animals, animals and other species they see on their hikes, can trips and other excursions. We use artificial neural network to train the image and build a deep learning model. In this project, we are creating a web application which uses a deep learning model, trained on different species of birds, flowers, plants, marine animals, animals and get the prediction of the bird when an image is been given.

## CHAPTER-2

### LITERATURE SURVEY

#### 2.1 Existing problem

The Problem is to classify the type of species. The key relationship in this work is between field biologist and technologists, thus many of our activities will involve hybrid artistic and scientific examinations of the wildness surrounding us. For instance we may develop biological tools for studying nearby creatures, and then adapt these into artistic devices for continued exploration and sharing of this phenomena. There is a subscription plan for accessing that app or website.

#### 2. References

1. Official webpage of iNaturalist : <https://www.inaturalist.org/observations>
2. Official website : <https://nora.nerc.ac.uk/id/eprint/528851/1/N528851JA.pdf>
3. Official website : <https://news.microsoft.com/features/like-taking-a-whole-scientific-team-with-you-on-a-walk-inaturalist-helps-spawn-a-generation-of-citizen-scientists/>

#### 2.3 Problem Statement Definition

| Problem Statement (PS) | I am (Customer) | I'm trying to                              | But                           | Because                     | Which make me feel |
|------------------------|-----------------|--|-------------------------------|-----------------------------|--------------------|
| PS-1                   | Researchers     | Scan the species to identify the behaviour | Unable to get the clear image | It contains low pixel value | Upset              |

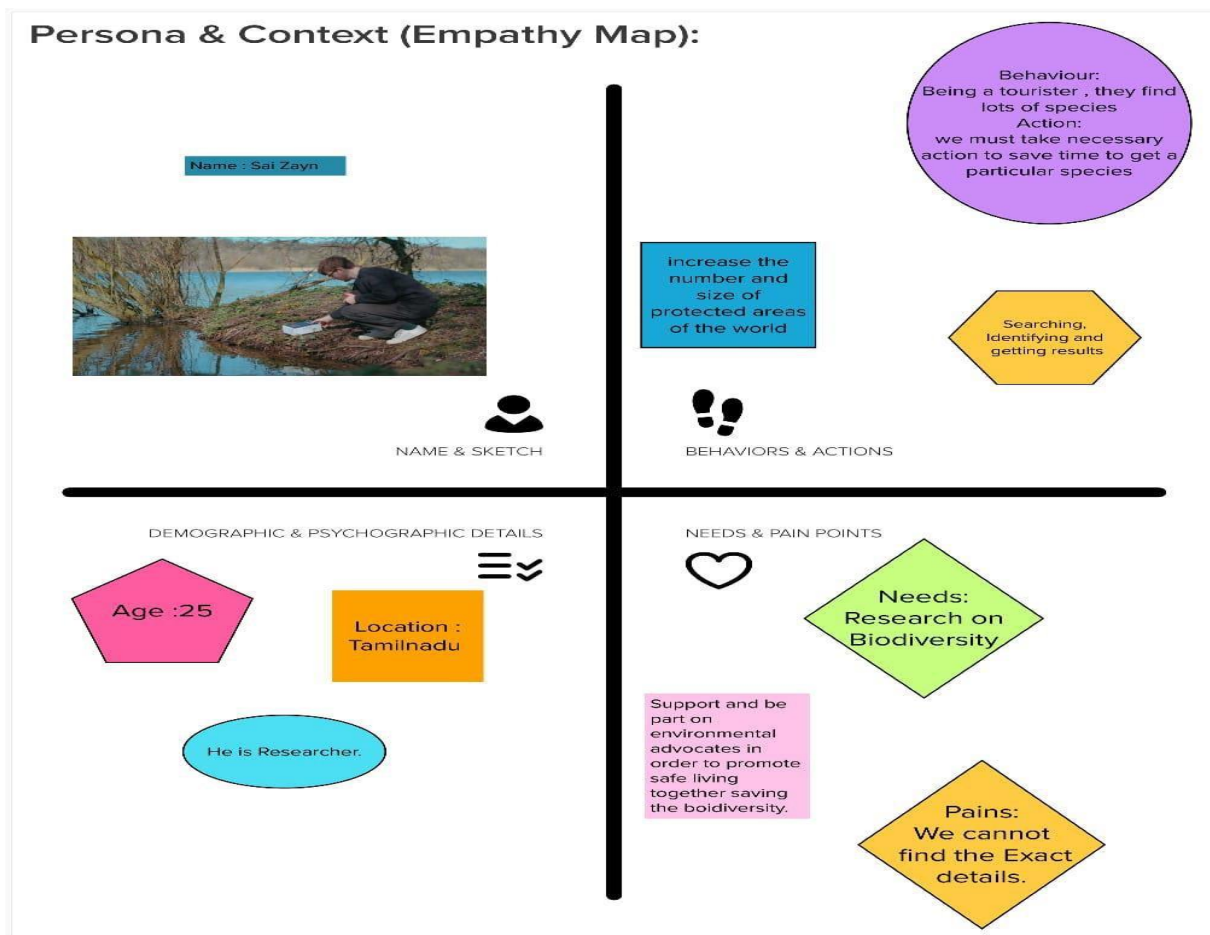
|      |         |                     |                   |                           |       |
|------|---------|---------------------|-------------------|---------------------------|-------|
| PS-2 | Student | Explore the species | Unable to predict | It is poisonous or danger | Panic |
|------|---------|---------------------|-------------------|---------------------------|-------|

## CHAPTER-3

### IDEATION AND PROPOSED SOLUTION

#### 3.1 Empathy Map Canvas

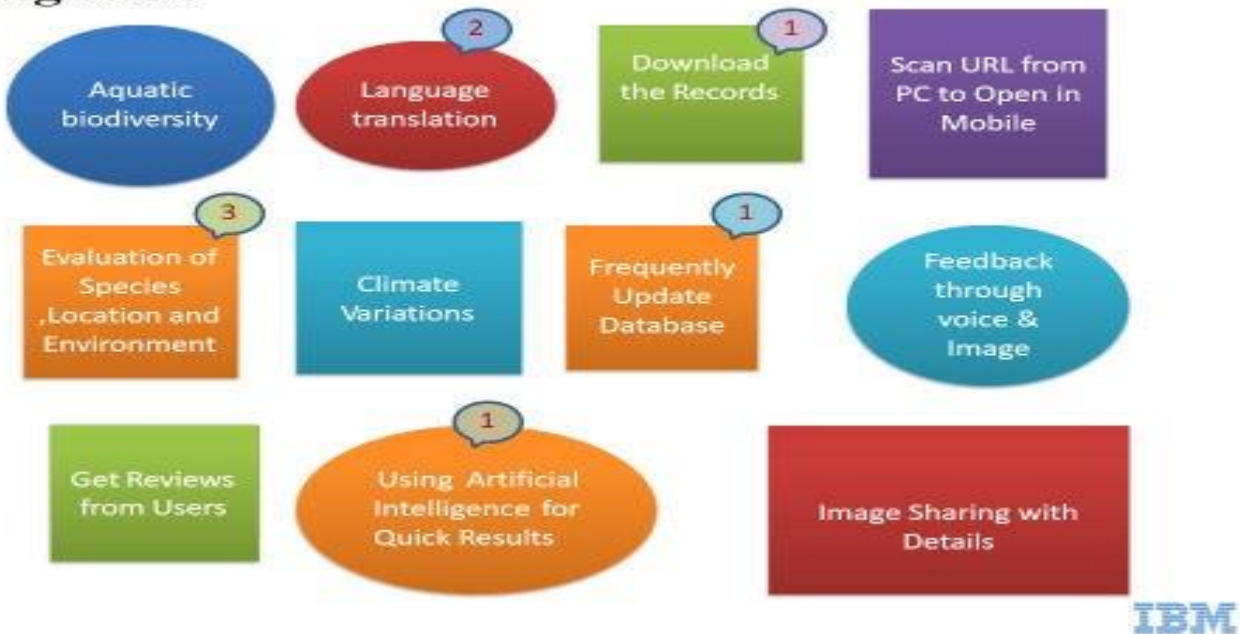
An empathy map is a collaborative tool teams can use to gain a deeper insight into their customers. Much like a user persona, an empathy map can represent a group of users, such as a customer.



### 3.2 Big Ideas

It consists of all the ideas of instruments and equipments that we are going to implement in this project.

#### Big Idea



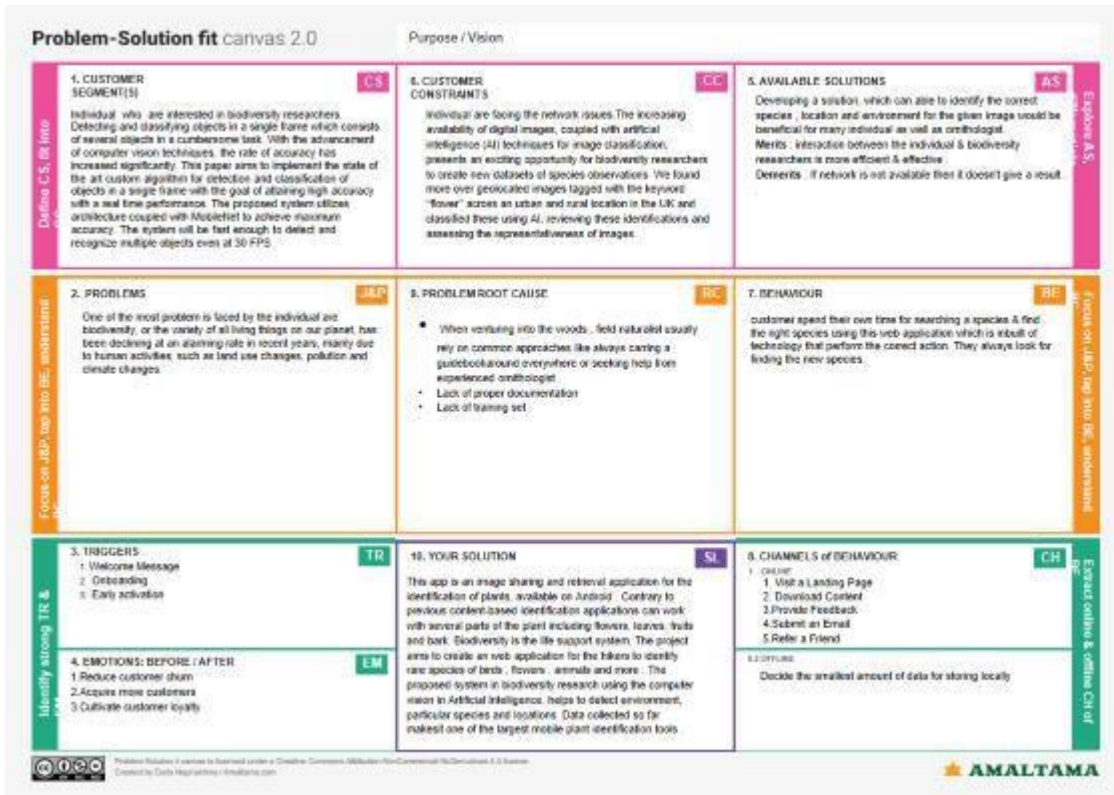
### 3.3 Idea Prioritization

It deals with the prioritizing of the big ideas in order of highest to lowest likes.

#### Idea Prioritization



### 3.4 Problem Solution Fit



### 3.5 Proposed Solution

| S.No | Parameter                                       | Description   |
|------|---|---|
| 1.   | <b>Problem Statement (Problem to be solved)</b> | Digital Naturalist -AI Enabled Tools for Biodiversity Researchers   |
| 2.   | <b>Idea / Solution description</b>              | Biodiversity is the life support system. The project aims to create an web application for the hikers to identify rare species of birds , flowers , animals and more . The proposed system in biodiversity research using the computer vision in Artificial Intelligence. This will helps to detect the environment, particular species and locations |
| 3.   | <b>Novelty / Uniqueness</b>                     | Image analysis and flora & fauna detected using “ <b>Advanced Artificial intelligence</b> ”.  |



|    |  |   |
|----|--|---|
| 4. | <b>Social Impact / Customer Satisfaction</b> | Besides the general plant recognition, many others concentrate especially on identifying flowers, trees, vegetables, weeds, & pond plants, mushrooms, wildflowers, indoor plants, edible and medicinal plants, and more. someone who just loves plants and wants to know more about them, you will encounter many situations when you'll need to find out the name of a specific herb, weed, tree, or flower by using this app through online.<br>. |
| 5. | <b>Business Model (Revenue Model)</b>        | <ol style="list-style-type: none"> <li>1. Can make money through the Subscription process .</li> <li>2. Partnership with many laboratories and scientists around the world.</li> <li>3. By giving additional information the users can get more benefits &amp; information about the plan.</li> </ol>   |
| 6. | <b>Scalability of the Solution</b>           | Image detection , searching species in advanced Artificial Intelligence. It shows the information about the species at anywhere with the access of internet   |

## CHAPTER-4

### REQUIREMENT ANALYSIS

#### 4.1 Functional Requirements

| FR No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task)  |
|--------|-------------------------------|---|
| FR-1   | User registration             | Registration through Form Registration through Gmail  |
| FR-2   | User Confirmation             | Confirmation viaEmail Confirmation via OTP  |
| FR-4   | User Details                  | Users are required to register their personal details. .<br>Like name, age, phone no, email, address, and etc   |
| FR-5   | User requirements             | The user simply inputs of the searching species image. The software will instantly generate accurate image of species to the individuals and also provide the suitable environment . This software is also provide the additional information about the plant.<br>. |

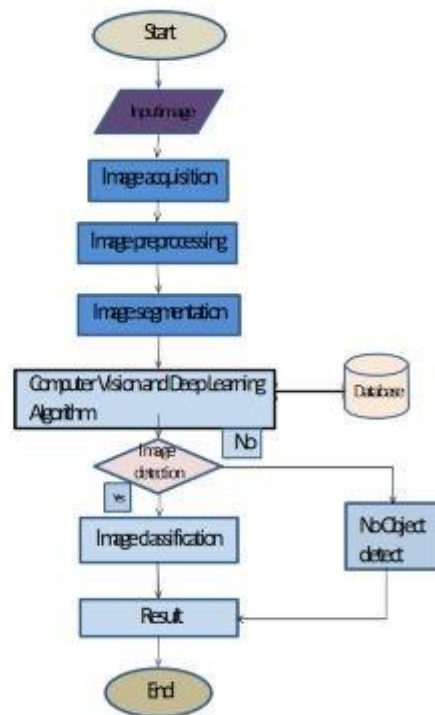
#### 4.2 Non-Functional Requirements

| FR No. | Non-Functional Requirement | Description  |
|--------|----------------------------|--|
| NFR-1  | <b>Usability</b>           | Efficient for the frequent users.users can easily understand what the application does and feel satisfied with the system.   |
| NFR-2  | <b>Security</b>            | <ul style="list-style-type: none"><li>• AI powered nutrition analyzer for fitness should contain more security in which our data which entered or maintained should be more security.</li><li>• With the help of the username and password it provides more security in which it can access more securable and the data are private.</li></ul> |
| NFR-3  | <b>Reliability</b>         | This application must perform without failure in 95 percent of use cases during a month  |

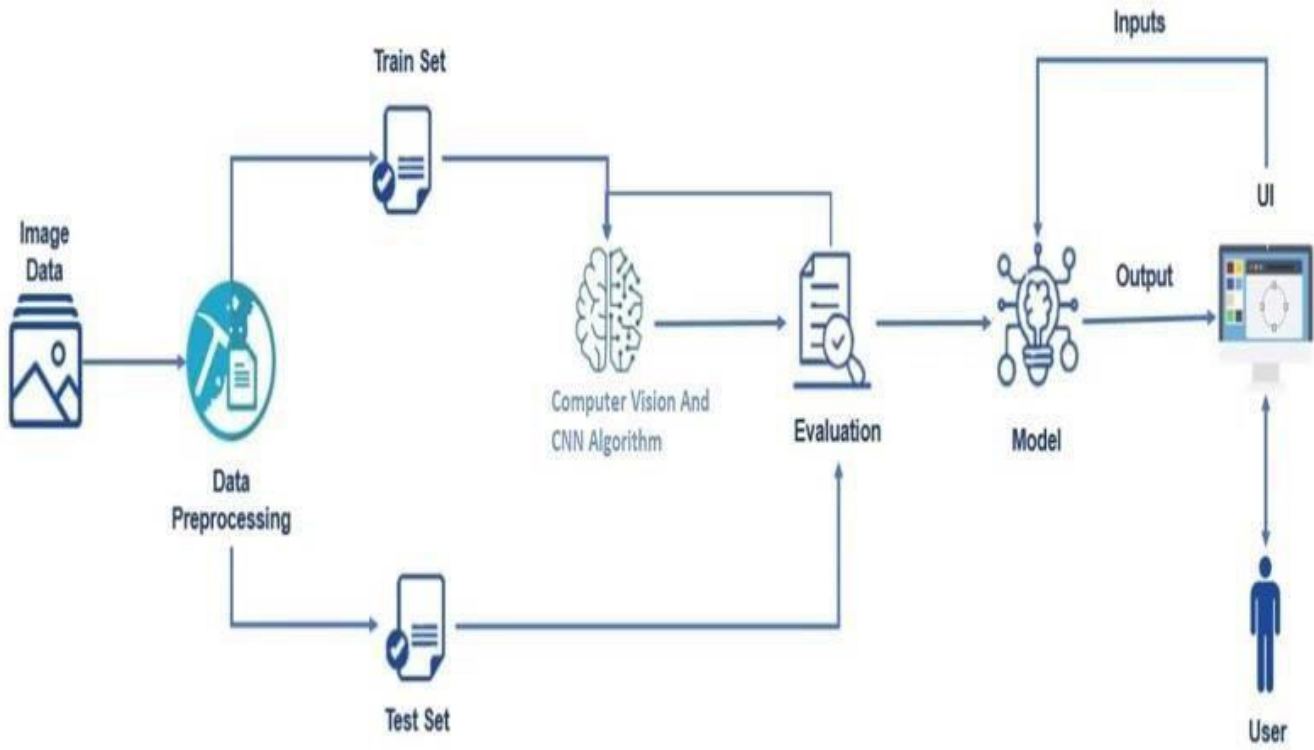
|       |                     |   |
|-------|---------------------|---|
| NFR-4 | <b>Performance</b>  | This application supporting 1,000 users per hour must provide 6 seconds or less response time in a desktop browser, including the rendering of text and images, over an LTE connection. |
| NFR-5 | <b>Availability</b> | The web dashboard must be available to user's 99.9 percent of the time every month during business hours EST. Users can access every time.  |
| NFR-6 | <b>Scalability</b>  | The application must be scalable enough to support 10,000 visits at the same time while maintaining optimal performance   |

## CHAPTER-5 PROJECT DESIGN

### 5.1 Data Flow Diagram



## 5.2 Solution & Technical Architecture



## 5.3 Customer Journey Map



## CHAPTER-6 PROJECT PLANNING PHASE

### 6.1 Sprint Planning, Schedule & Estimation

| Sprint   | Functional Requirement (Epic)                     | User Story Number | User Story / Task  | Story Points | Priority | Team Members                                     |
|----------|---|-------------------|--|--------------|----------|--|
| Sprint-1 | Registration                                      | USN-1             | As an biogeography, I can register for the application by entering my email, password, and confirming my password.   | 2            | High     | Shaarmila R<br>Meenakshi S Sneha M<br>Swetha T R |
| Sprint-1 | Login   | USN-3             | As an biogeography, I can log<br><br>into the application by entering email & password<br>As an biogeography, I can log<br>into the application by entering email & password   | 2            |          | Shaarmila R<br>Meenakshi S Sneha M<br>Swetha T R |
| Sprint-2 | Data Collection                                   | USN-1             | Download the dataset used in Digital Naturalist – AI<br>Enable tools for Biodiversity Researchers  | 2            | High     | Shaarmila R<br>Meenakshi S Sneha M<br>Swetha T R |
| Sprint-2 | Image Preprocessing                               | USN-1             | Improving the image data that suppresses unwilling distortions or enhances some image features important for further processing, although performing some geometric transformations of images like rotation, scaling, etc                                    | 1            | High     | Shaarmila R<br>Meenakshi S Sneha M<br>Swetha T R |
| Sprint-3 | Getting started with Convolutional Neural Network | USN-1             | Neural network are integral for teaching computers to think and learn by classify information similar to how we as humans learn. With neural networks, software can learn to recognize images, for example. Machines can also make predictions and decisions | 2            | High     | Shaarmila R<br>Meenakshi S Sneha M<br>Swetha T R |

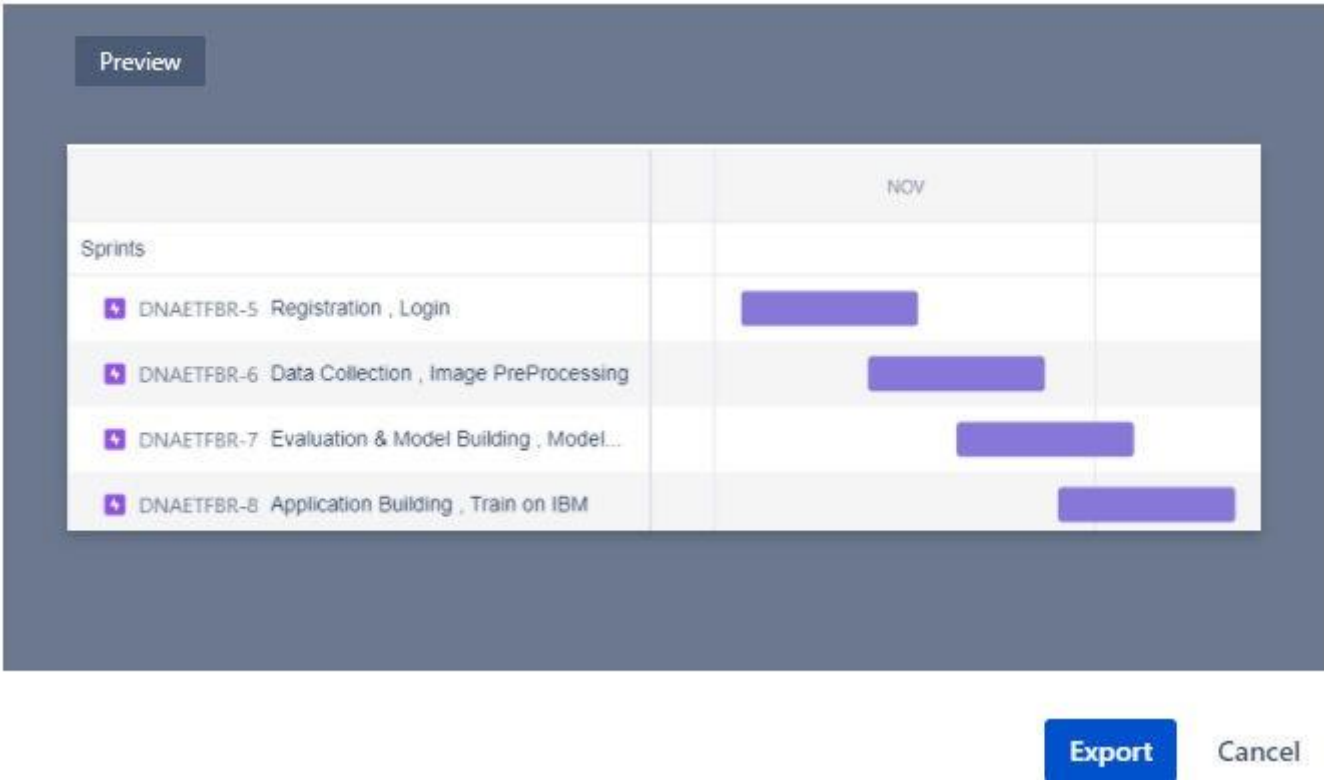
|          |                             |       |   |   |        |  |
|----------|-----------------------------|-------|---|---|--------|--|
|          |                             |       | with a high level of accuracy on data inputs  |   |        |  |
| Sprint-3 | Evaluation and model saving | USN-1 | well a model behaves after each iteration of optimization.<br>An accuracy metric is used to measure the algorithm's performance in an interpretable way. The accuracy of a model is usually determined after the model parameters and is calculated in the form of a percentage.<br>Saving The Model<br>get_weights , set_weights . | 1 | Medium | Shaarmila R<br>Meenakshi S Sneha M<br>Swetha T R |
| Sprint-4 | Application Building        | USN-2 | After the model is built, we will be integrating it to a web application so that normal users can also use it. The users need to give the images of species   | 1 | High   | Shaarmila R<br>Meenakshi S Sneha M<br>Swetha T R |
| Sprint-4 | Train the Model on IBM      | USN-2 | Build Deep learning model and computer vision Using the IBM cloud.  | 2 | High   | Shaarmila R<br>Meenakshi S Sneha M<br>Swetha T R |

## 6.2 Sprint Delivery Schedule

| Sprint   | Total Story Points | Duration | Sprint Start Date | Sprint End Date (Planned) | Story Points Completed (as on Planned End Date) | Sprint Release Date (Actual) |
|----------|--------------------|----------|-------------------|---------------------------|---|------------------------------|
| Sprint-1 | 20                 | 4 Days   | 24 Oct 2022       | 27 Oct 2022               | 20  | 29 Oct 2022                  |
| Sprint-2 | 20                 | 5 Days   | 28 Oct 2022       | 01 Nov 2022               | 20  | 04 Nov 2022                  |
| Sprint-3 | 20                 | 8 Days   | 02 Nov 2022       | 09 Nov 2022               | 20  | 11 Nov 2022                  |
| Sprint-4 | 20                 | 9 Days   | 10 Nov 2022       | 18 Nov 2022               | 20  | 19 Nov 2022                  |



6.3 Reports From JIRA



## CHAPTER-7

### CODING AND SOLUTION

#### 7.1 Feature

```
from __future__ import division, print_function import os
import numpy as np import tensorflow as tf
from tensorflow.keras.preprocessing import image
from tensorflow.keras.models import load_model from flask import Flask, request, render_template
from werkzeug.utils import secure_filename
import mysql.connector

global graph
#graph=tf.get_default_graph()
# Define a flask app app = Flask(__name__)
model = load_model('natur1.h5')

print('Model loaded. Check http://127.0.0.1:5000/')
conn=mysql.connector.connect(host="localhost", user="root", password="",
database="login") cursor=conn.cursor()

@app.route('/') # route to display the home page def home():
return render_template('index.html') # rendering the home page

@app.route('/index', methods=['GET','POST']) def index():
# Main page
return render_template('digital.html')

@app.route('/login')
```

```

def login(): # put application's code here return render_template('login.html')


@app.route('/register')
def register(): # put application's code here return render_template('register.html')


@app.route('/login_validation', methods=['POST']) def login_validation():
email = request.form.get('email') password = request.form.get('password')

cursor.execute("""SELECT * FROM `users` WHERE `email` LIKE'{' AND `password` LIKE
'{'""".format(email, password))
users = cursor.fetchall()

if len(users) > 0:
return render_template('digital.html') else:
return render_template('login.html', prediction_text="1")


@app.route('/add_user', methods=['POST']) def add_user():
name = request.form.get('name') email = request.form.get('email')
password = request.form.get('password')

cursor.execute(
"""INSERT INTO `users`(`id`, `name`, `email`, `password`) VALUES
(NULL,'{'','{'','{'')""".format(name, email,
                                                                    password))

conn.commit()
return render_template('login.html', prediction_text="0")


@app.route('/predict', methods=['GET', 'POST']) def upload():
if request.method == 'POST':
# Get the file from post request f = request.files['image']

```

```

# Save the file to ./uploads
basepath = os.path.dirname(__file__) file_path = os.path.join(
basepath, 'uploads', secure_filename(f.filename))
f.save(file_path)
img = image.load_img(file_path, target_size=(64,64))

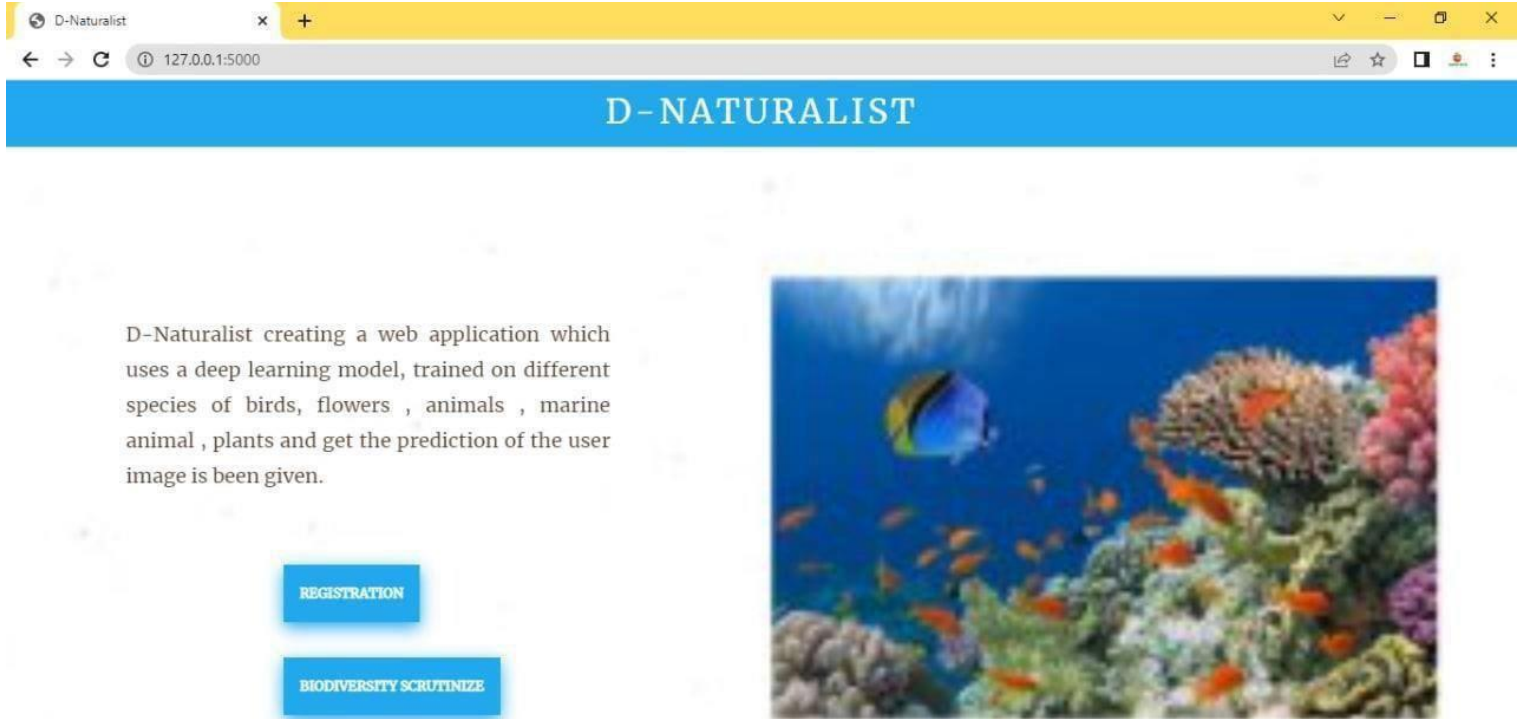
x = image.img_to_array(img) x = np.expand_dims(x, axis=0)

#with graph.as_default():
preds = np.argmax(model.predict(x))
found = ["Bird- Antbird - Large passerine bird family , subtropical and tropical Central and South
America, from Mexico to Argentina",
"Bird- Peacock - The blue peacock lives in India and Sri Lanka, ",
"Bird- Wild Turkey - Forest floors, but can also be found in grasslands and swamps ",
"Animal- Gatto - Continental Europe, southwestern Asia, the savannah regions of Africa and as a
pet.",
"Animal- Mucca - India, in east Africa, in northern Europe, and in South America", "Animal- Pecora -
The Arctic circle as far south as Patagonia",
"Flower- Rose - Most species are native to Asia, with smaller numbers native to Europe, North
America, and northwestern Africa",
"Flower- Sunflower - Indo-gangetic plains of Punjab, Haryana and UP in spring and Bihar, Odisha, West
Bengal ",
"Flower- Tulip - Himachal Pradesh and hilly areas of Jammu and Kashmir "]
print(preds)
text = found[preds] return text

if __name__ == '__main__': app.run(threaded = False)

```


## Dashboard Page:



## Login Page:

Water Quality Prediction x +

127.0.0.1:5000/login



### Login Now

mugesh9902@gmail.com

...


Login

Create Account! Register.

## Register Page:

Water Quality Prediction x +

127.0.0.1:5000/register



### Register Now


Register

[Have an account! Login.](#)

## Predict Page:

D-Naturalist x +

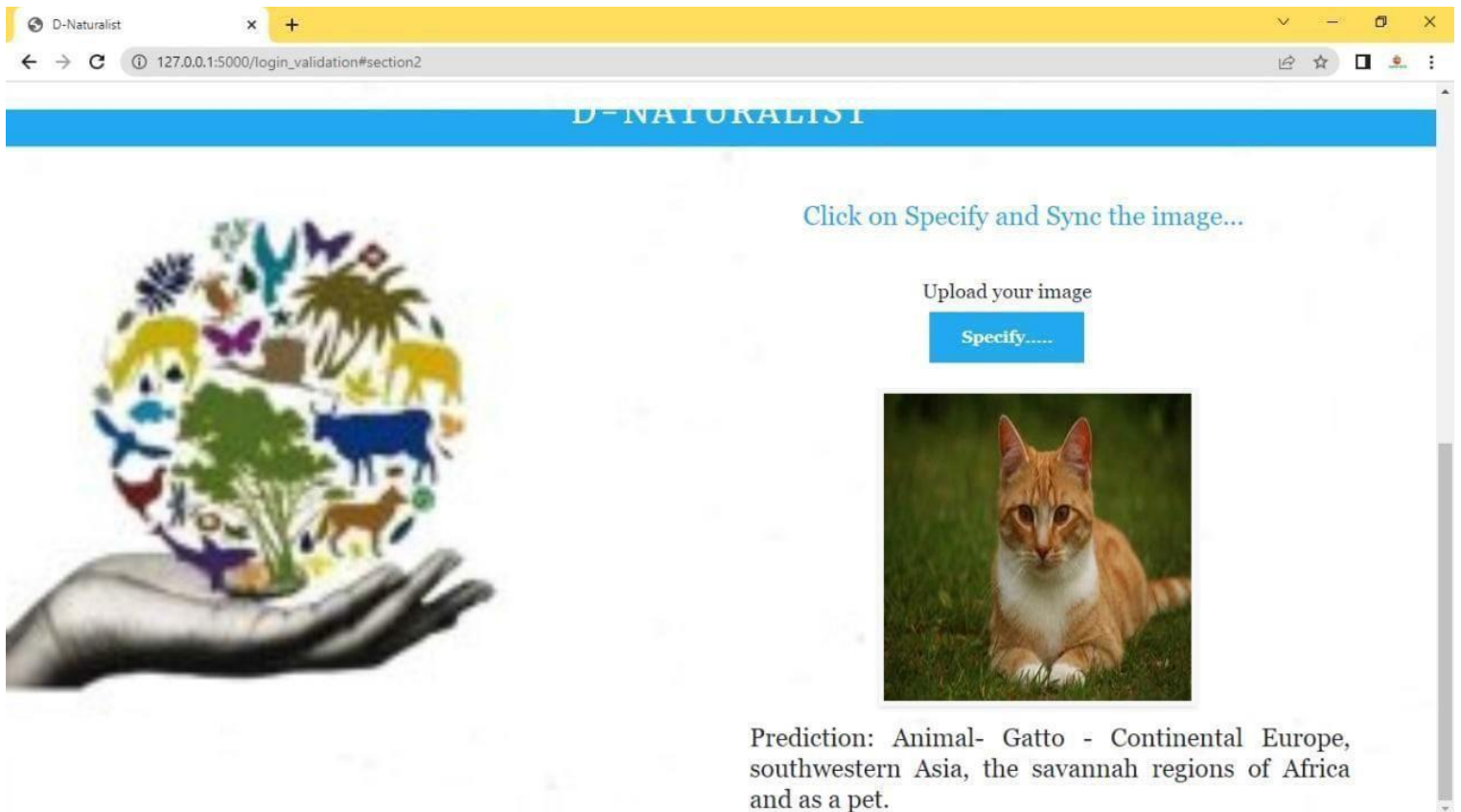
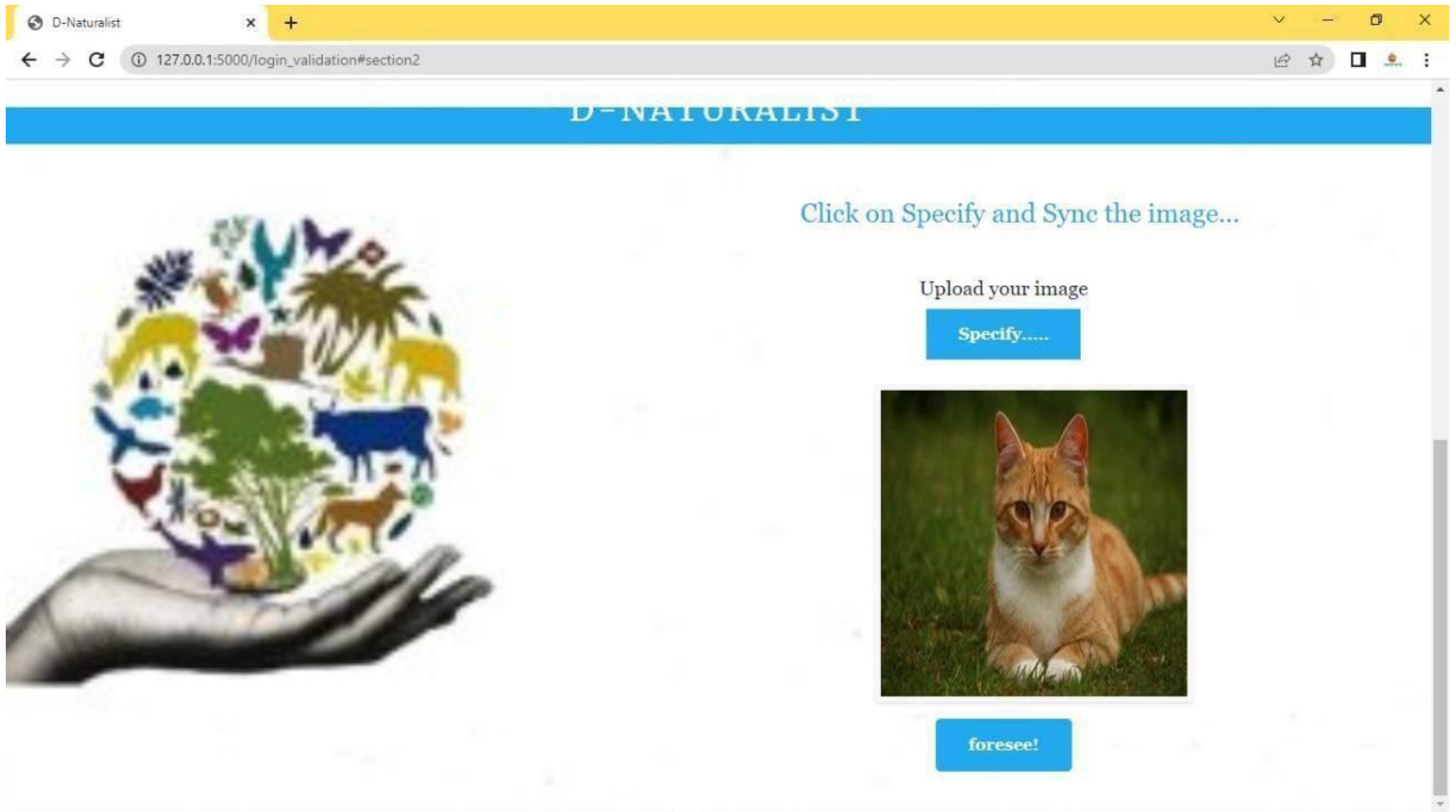
127.0.0.1:5000/login\_validation#section2



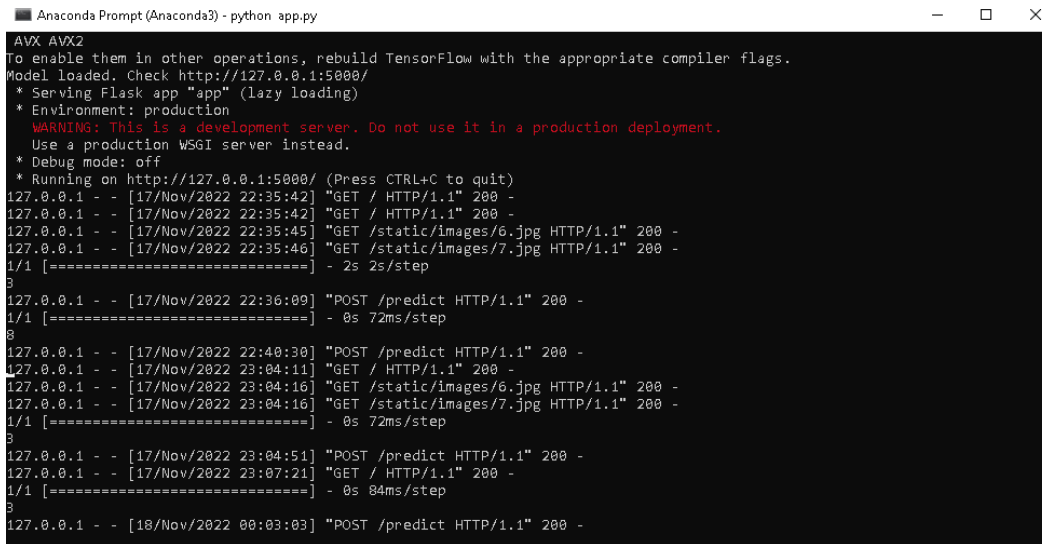
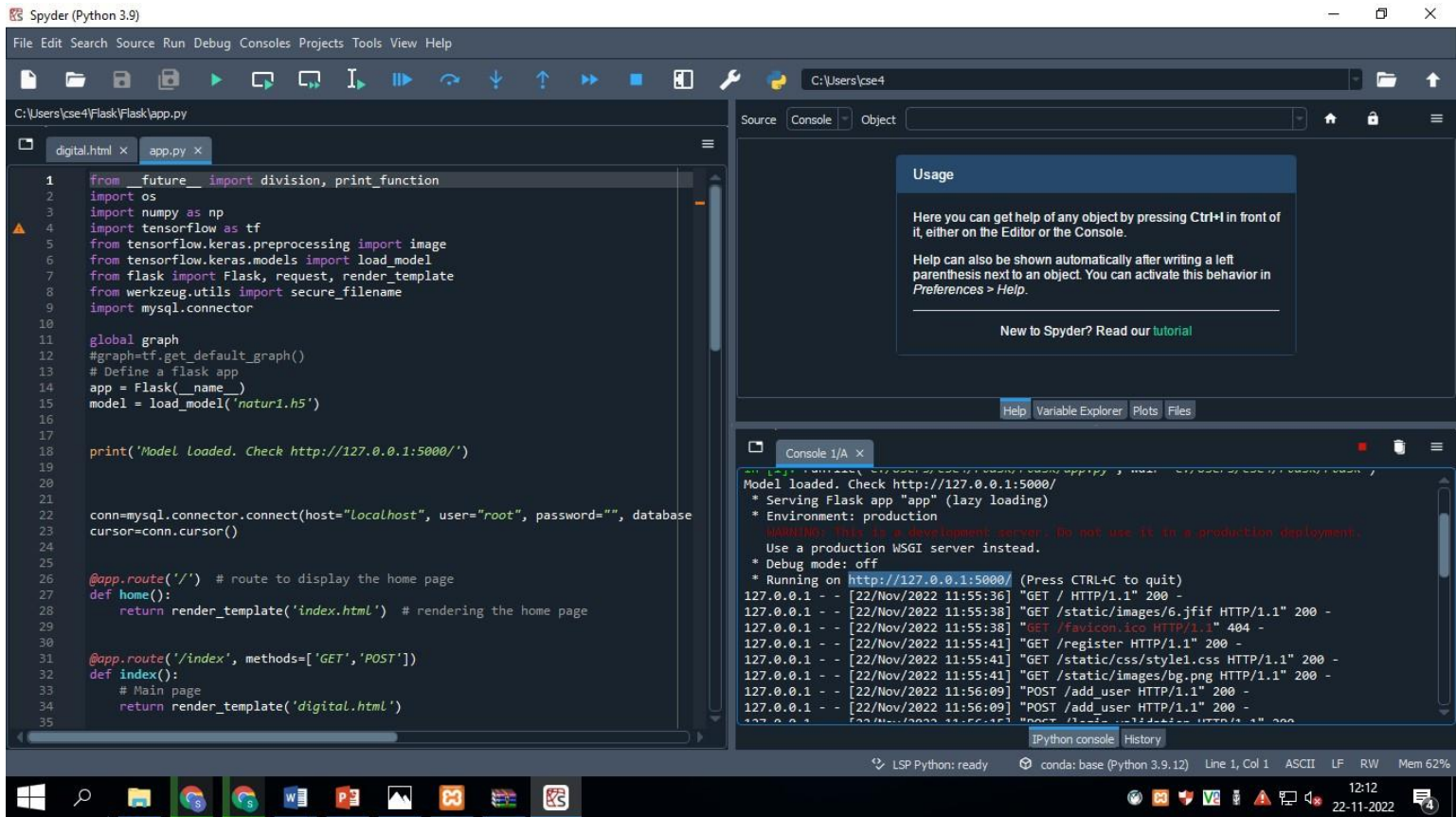
Click on Specify and Sync the image...

Upload your image

Specify.....







# CHAPTER-8

## TESTING

### 8.1 Test cases

| Test case ID        | Feature Type | Component    | Test Scenario   | Pre-Requeste | Steps To Execute   | Test Data   | Expected Result  | Actual Result       | Status | Comments | TC for Automation(Y/N) | BUG ID | Executed By              |
|---------------------|--------------|--------------|---|--------------|--|---|--|---------------------|--------|----------|------------------------|--------|--------------------------|
| HomePage_TC_001     | Functional   | Home Page    | Verify user is able to see the home page or not.        |              | 1. Enter URL and click go<br>2. Verify whether the user is able to see the home page.  | Enter URL and click go                                | User able to see the home page   | Working as expected | Pass   | Nil      | N                      | -      | Shaarmila R              |
| HomePage_TC_002     | UI           | Home Page    | Verify the UI elements in Home Page                     |              | 1. Enter URL and click go<br>2. Verify the UI elements in Home Page.   | Enter URL and click go                                | Application should show below UI elements:                                     | Working as expected | pass   | Nil      | N                      | -      | Sreetha T R              |
| RegisterPage_TC_003 | Functional   | RegisterPage | A. Register page is able to will Input the user data.   |              | 1. Enter URL and click go<br>2. Verify the UI elements in Home Page 3. Click the Register button   | Click in register page                                | Application should show 'Incorrect email or password' validation message.      | Working as expected | pass   | Nil      | N                      | -      | Sheha M                  |
| LoginPage_TC_004    | Functional   | login page   | Verify user is able to redirect to predict page or not. |              | 1. Enter URL and click go<br>2. Verify the UI elements in Home Page<br>3. Click the Login button<br>4. Click on Predict button<br>5. Verify whether the user to redirect to predict page or not.   | Click in login home page                              | Application should show 'Incorrect email or password' validation message.      | Working as expected | pass   | Nil      | N                      | -      | Meenakshi S              |
| PredictPage_TC_005  | UI           | Predict page | Verify the UI elements in Predict Page                  |              | 1. Enter URL and click go<br>2. Verify the UI elements in Predict Page.  | Click the predict button and redirect to predict page | Application should show below UI elements: Upload file Button, Predict button. | Working as expected | pass   | Nil      | N                      | -      | Shaarmila R, Sreetha T R |
| PredictPage_TC_006  | Functional   | Predict page | Verify user is able to select the predict               |              | 1. Enter URL and click go<br>2. Click on Predict button<br>3. Verify whether the user to redirect to predict page or not.  | species images  | Application should shows user to choose predict option                         | Working as expected | pass   | Nil      | N                      | -      | Shaarmila R, Sheha M     |
| PredictPage_TC_007  | Functional   | Predict page | Verify user is able to upload the image or not.         |              | 1. Enter URL and click go<br>2. Click on Predict button<br>3. Verify whether the user to redirect to predict page or not.<br>4. Verify user is able to select the dropdown value or not.<br>5. Verify user is able to upload the images or not.  | Images to be Uploaded                                 | Application should shows the uploaded image.                                   | Working as expected | pass   | Nil      | N                      | -      | Shaarmila R, Meenakshi S |
| PredictPage_TC_008  | Functional   | Predict page | Verify whether the image is predicted correctly or not  |              | 1. Enter URL and click go<br>2. Click on Predict button<br>3. Verify whether the user to redirect to predict page or not.<br>4. Verify user is able to select the dropdown value or not.<br>5. Verify user is able to upload the images or not.<br>6. Verify whether the image is predicted correctly or not | Click the Predict button                              | Application shows the predicted output   | Working as expected | pass   | Nil      | N                      | -      | Meenakshi S              |

## 8.2 User Acceptance Testing

### 1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

### 2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved.

| Resolution     | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Subtotal |
|----------------|------------|------------|------------|------------|----------|
| By Design      | 7          | 7          | 9          | 6          | 29       |
| Duplicate      | 5          | 0          | 2          | 0          | 7        |
| External       | 1          | 2          | 0          | 3          | 6        |
| Fixed          | 14         | 1          | 6          | 6          | 27       |
| Not Reproduced | 0          | 0          | 1          | 0          | 1        |
| Skipped        | 0          | 0          | 1          | 1          | 2        |
| Won't Fix      | 0          | 5          | 1          | 0          | 6        |
| Totals         | 27         | 15         | 20         | 16         | 80       |

### 3. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested.


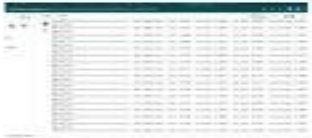
| Section             | Total Cases | Not Tested | Fail | Pass |
|---------------------|-------------|------------|------|------|
| Print Engine        | 7           | 0          | 0    | 7    |
| Client Application  | 29          | 0          | 0    | 29   |
| Security            | 3           | 0          | 0    | 3    |
| Outsource Shipping  | 3           | 0          | 0    | 3    |
| Exception Reporting | 9           | 0          | 0    | 9    |
| Final Report Output | 7           | 0          | 0    | 7    |
| Version Control     | 2           | 0          | 0    | 2    |

## CHAPTER-9 RESULTS

### 9.1 Performance Metrics

#### Model Performance Testing:

Project team shall fill the following information in model performance testing template.

| S.No. | Parameter     | Values   | Screenshot  |
|-------|---------------|--|---|
| 1.    | Model Summary | <p>Total params: 14,840,133</p> <p>Trainable params: 125,445</p> <p>Non-trainable params: 14,714,688</p> |  <p>The screenshot shows a detailed breakdown of the model's layers and parameters. It lists the number of input, hidden, and output units, the number of parameters in each layer, and the total number of parameters. The total number of parameters is 14,840,133, with 125,445 trainable parameters and 14,714,688 non-trainable parameters.</p>                |
| 2.    | Accuracy      | <p>Training Accuracy - 88.72</p> <p>Validation Accuracy - 90.37</p>                                      |  <p>The screenshot shows a table of training and validation accuracy over time. The table has columns for 'Epoch', 'Training Accuracy', 'Validation Accuracy', and 'Loss'. The training accuracy starts at 0.00 and increases to 0.8872, while the validation accuracy starts at 0.00 and increases to 0.9037. The loss starts at 0.00 and decreases to 0.00.</p> |

```
[18] model = Model(inputs=vgg16.input, outputs=prediction)
```

```
model.summary()
```

Model: "model"

| Layer (type)               | Output Shape          | Param # |
|----------------------------|-----------------------|---------|
| input_1 (InputLayer)       | (None, 224, 224, 3)   | 0       |
| block1_conv1 (Conv2D)      | (None, 224, 224, 64)  | 1792    |
| block1_conv2 (Conv2D)      | (None, 224, 224, 64)  | 36928   |
| block1_pool (MaxPooling2D) | (None, 112, 112, 64)  | 0       |
| block2_conv1 (Conv2D)      | (None, 112, 112, 128) | 73856   |
| block2_conv2 (Conv2D)      | (None, 112, 112, 128) | 147584  |
| block2_pool (MaxPooling2D) | (None, 56, 56, 128)   | 0       |
| block3_conv1 (Conv2D)      | (None, 56, 56, 256)   | 295168  |
| block3_conv2 (Conv2D)      | (None, 56, 56, 256)   | 590080  |
| block3_conv3 (Conv2D)      | (None, 56, 56, 256)   | 590080  |
| block3_pool (MaxPooling2D) | (None, 28, 28, 256)   | 0       |
| block4_conv1 (Conv2D)      | (None, 28, 28, 512)   | 1180160 |
| block4_conv2 (Conv2D)      | (None, 28, 28, 512)   | 2359808 |

+ Code + Text

```
block2_pool (MaxPooling2D) (None, 56, 56, 128) 0
block3_conv1 (Conv2D) (None, 56, 56, 256) 295168
block3_conv2 (Conv2D) (None, 56, 56, 256) 590080
block3_conv3 (Conv2D) (None, 56, 56, 256) 590080
block3_pool (MaxPooling2D) (None, 28, 28, 256) 0
block4_conv1 (Conv2D) (None, 28, 28, 512) 1180160
block4_conv2 (Conv2D) (None, 28, 28, 512) 2359808
block4_conv3 (Conv2D) (None, 28, 28, 512) 2359808
block4_pool (MaxPooling2D) (None, 14, 14, 512) 0
block5_conv1 (Conv2D) (None, 14, 14, 512) 2359808
block5_conv2 (Conv2D) (None, 14, 14, 512) 2359808
block5_conv3 (Conv2D) (None, 14, 14, 512) 2359808
block5_pool (MaxPooling2D) (None, 7, 7, 512) 0
flatten (Flatten) (None, 25088) 0
dense (Dense) (None, 5) 125445

Total params: 14,840,133
Trainable params: 125,445
Non-trainable params: 14,714,688
```



## **CHAPTER-10**

### **ADVANTAGES & DISADVANTAGES**

#### **10.1 ADVANTAGE:**

- ✓ We detect the Species by using the image.
- ✓ Most Accurate
- ✓ No subscription plan
- ✓ It does not require any special hardware because it can be implemented with low-cost devices such as cameras

#### **10.2 DISADVANTAGE:**

- ✓ Internet with a good connection.
- ✓ Our model is that the accuracy rate is low when the input image is not clear.
- ✓ Consumes time to and the system may not be able to recognize some numbers, such as possible.

## **CHAPTER-11**

### **CONCLUSION**

Field naturalists can only use this web application from anywhere to identify the birds, flowers, animals, marine animals and plants and other species they see on their hikes, canoe trips and other excursions. In this project, we are creating a web application which uses a deep learning model, trained on different species of birds, flowers, animals, marine animals and plants. There is great diversity among naturalists, but some common ground too. All naturalism begin with an admiring attitude towards science and its achievements. In many cases this admiring attitude is combined with a contempt or distrust for the way that philosophy has been or is conducted. This combination of views has a long history. Many of the advocates of first philosophy, Descartes, Kant and Carnap, shared the same admiration of science or nascent science and distrust of philosophy. Descartes, for example, uses scepticism as a device to sweep away the old Aristotelian foundations of knowledge, so that he can build an entirely new philosophy that makes room for the new mathematical science.

## **CHAPTER-12**

### **FUTURE SCOPE**

In this project, we proposed a method for efficient Digital naturalist for biodiversity researchers. With the application of AI the data can be stored and retrieved from anywhere. In this proposed work, the image detection is for the specified species, hence in future it can be automated for detection the species and provide the more details about the scientific name, location characteristics. AI can also be used to extract information from big data in order to address various challenges faced by society. Using computer vision, natural language processing, and robotic automation, manufacturers are producing vehicles that are safer and more comfortable.



## CHAPTER-13

### APPENDIX

**Github :** <http://bitly.ws/x23f>

**Demo Link :** <http://bitly.ws/x239>