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.

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 sub classes in each for a quick understanding)and get the prediction of the bird when an image is been given..

1.2 Purpose

Some of the Tourists,Field Naturalists,Biodiversity Researchers wants to explore the Naturals among Earth such as Flowers,Animals,Birds ,etc.. At that Time they need a guidebooks or seeking some professionals like Botanist,Zoologists,Ornithologists,etc.

To explore more natural species in our world by the Filed Naturalist ,So They need a Handy tool for Capture and Identify the Natural species among Earth. This is the WebApplication using Deep Learning algoithm to Predict Different species in outside world.

There should be a handy tool for them to capture, identify and share the beauty to the outside world.

2.LITERATURE SURVEY

2.1 Existing Problem

In the existing system Field Naturalist can use the Encyclopedia Books,Guide persons,some of the professionals like Botanist,Zoologist,Ornithologists,etc.. to identy the Natural species in world. Also the Google lens is one of the tool which gives the results like related images But not give the correct accuracy of details .Also Plantix app is only used to identify the plants also it is used by the Apple Iphone users .Plantix App does not support By the Android devices.

2.2 References

2.2.1 Simon Haykin, “Bird classification using CNN: a comprehensive foundation,” Prentice Hall PTR, 1994.

“Bird classification using CNN” by Simon Haykin: This work presents a scenario with classification of birds using CNN technique based on color features. They used color images of birds with almost similar types. Image segmentation is carried in various stages. At first, the pixels are arranged and segmented on the basis of edges and spatial segmentation, where clustering is done. Next, the blocks are segmented using edge detection. The computational efficiency increases for image and training becomes easier. This approach provides with better and robust results for different images. Here they took sparrow for the case study and evaluated the features of it using the steps up listed. The experimental results classify the effectiveness of proposed approach to improve the segmentation quality in aspects of precision and computational time .

2.2.2 Schmid Huber J, “Adapted approach for Species Classification: An Overview Neural Networks” 61: 85-117, 2015.

“Adapted approach for Species Classification” by Schmid Huber, J.: In this work, an adaptive approach for the identification of species is proposed and experimentally validated. Image processing technique is followed. In the first step K-Means clustering is used for image segmentation, in the second step some state of art features is extracted from segmented image, and finally images are classified under one of the classes by using multi-class support vector machine. The classification accuracy is achieved up to 89%.

2.2.3 Haibing Wu and Xiaodong Gu, “Detection and Classification of images using Detection Line” 71,1–10, 2015.

“Detection And Classification of images using Detection Line” by Haibing Wu and Xiaodong Gu: In this study, they present an application of neural networks and image processing techniques for detecting and classifying images. Images were segmented by a detection line (DL) method. Six geometric features (i.e., the principal axis length, the secondary axis length, axis number, area, perimeter and compactness of the image), 3 color features (i.e., the mean gray level of image on the R, G, and B bands. The methodology presented herein effectively works for classifying image to an accuracy of 90.9% .

2.2.4 Gary Bradski and Adrian Kaehler. “Texture Classification from Random Features”, 2008.

“Texture Classification from Random Features” by Gary Bradski and Adrian Kaehler: presented an approach for texture classification based on random projection, suitable for large texture database applications. A small set of random features are extracted from local image patches and those features are embedded into a bag-of-words model to perform texture classification .

2.2.5 Paul Viola, Michael Jones, “Classification and Grading of Image Using Texture Based Block-Wise Local Binary Patterns” CVPR (1) 1 (2001), 511–518, 2001.

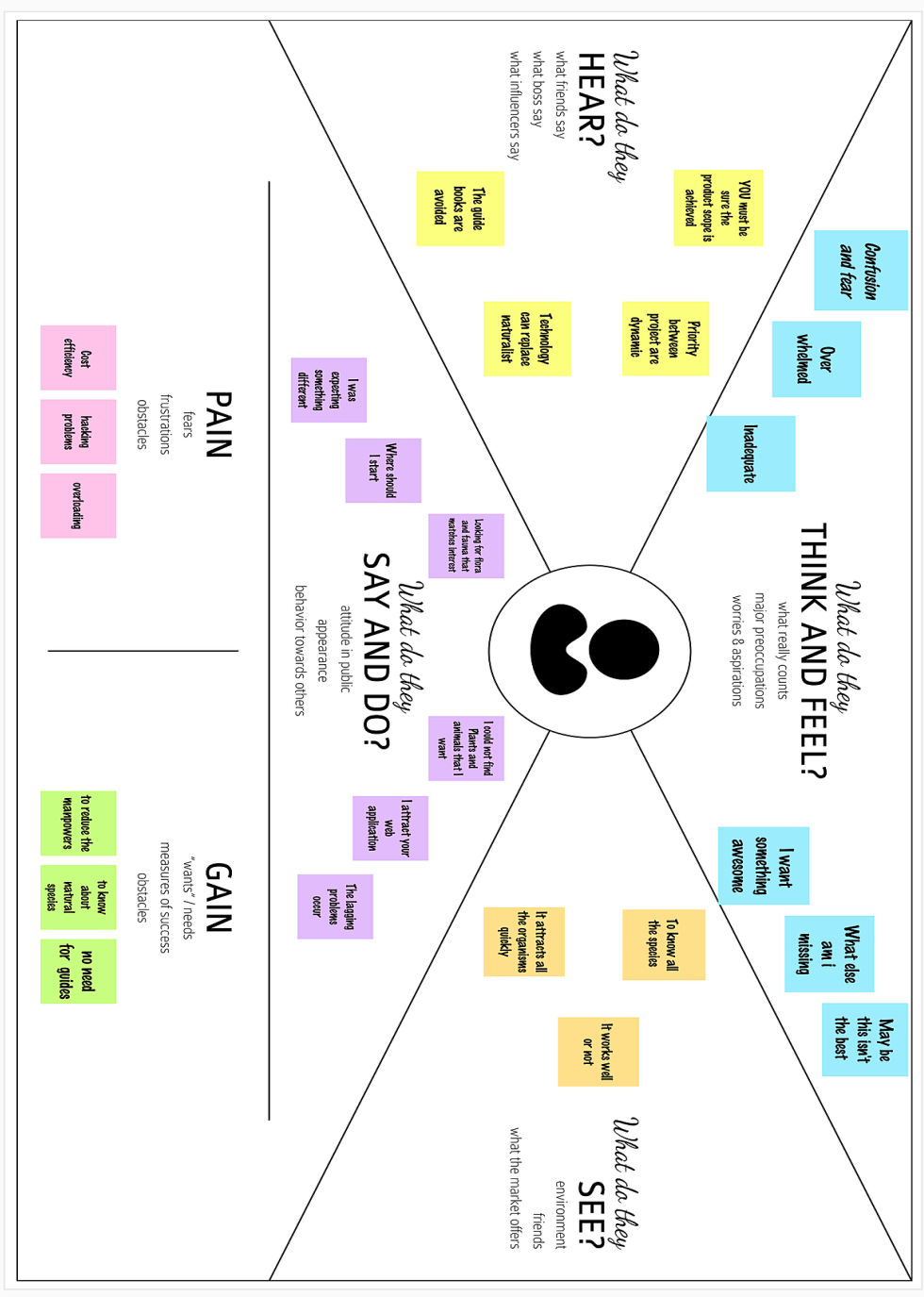
“Classification and Grading of Image Using Texture Based Block-Wise Local Binary Patterns” by Paul Viola, Michael Jones: They proposed approach makes use of global textural feature viz., Local Binary Pattern for feature extraction. Initially, an image is divided into k number of blocks. Subsequently, the texture feature is extracted from each k blocks of the image. The k value is varied and has been fixed empirically. For experimentation purpose,and also with different blocks like 2, 4 and 8. Grading of Bird is done using Support Vector Machine classifier. Finally, the performance of the grading system is evaluated through metrics like accuracy, precision, recall and F-measure computed from the confusion matrix.

2.3 Problem Statement Definition

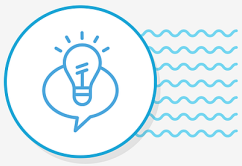
1. To educate hikers, travelers about the species they were looking at.
2. To differentiate the variety of breed among the same species.
3. To identify the birds, flowers, mammals and other species.
4. To recognize each and every flora and fauna that the AI tool captures
5. To provide the user friendly interface to identify the species.

3.IDEATION AND PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

10 minutes to prepare
1 hour to collaborate
2-8 people recommended

Share template feedback

1

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

5 minutes

PROBLEM

How might the Biodiversity researcher Identify Different Species of Flora and Fauna In Some Wild Spaces For his Research Purpose?

Key rules of brainstorming

To run an smooth and productive session

- Stay in topic.
- Encourage wild ideas.
- Defer judgment.
- Listen to others.
- Go for volume.
- If possible, be visual.

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

S.Vasanth Kumar

To collect The Flower,plants and Animal Species images	Use Image Classification	To Build CNN model
To test the CNN model using the another images	To Predict The Flower and Plant spcies	To Predict The Animals Species
Save and implement the model in Web App	To Build Web app using Flask	Upload the image in Web app

B.Vasanth Kumar

To Collect all the Flora And Fauna species images	Use Computer Vision	Build the Computer Vision model
Create the mobile app	To implement that Model	To Detect Flora and fauna Species
And identify those Species	This could be a Handy tool for Bio diversity	It could detect only the learned objects

P.DhanaSekaran

To Create a web Application	That contains a Data base	The database Are stored with all images
To upload the images of any species	To store and retrieve from the database	The database retrieve that image information

V.ShyamSundhar

To Collect the Species images	Use Data Visualization using python	To visualize the Flora and fauna Species
To Calssify the different species	That will looks the web attractive	The analytics are display about the species

V.Kumaran

To collect the all the images	To make category	To collect the videos of Flora and fauna
Upload the videos of those Species in Web	To build web	To Calssify that videos in categories
To upload the information in form of label	To Detect the images in that videos	To identify using object identification

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

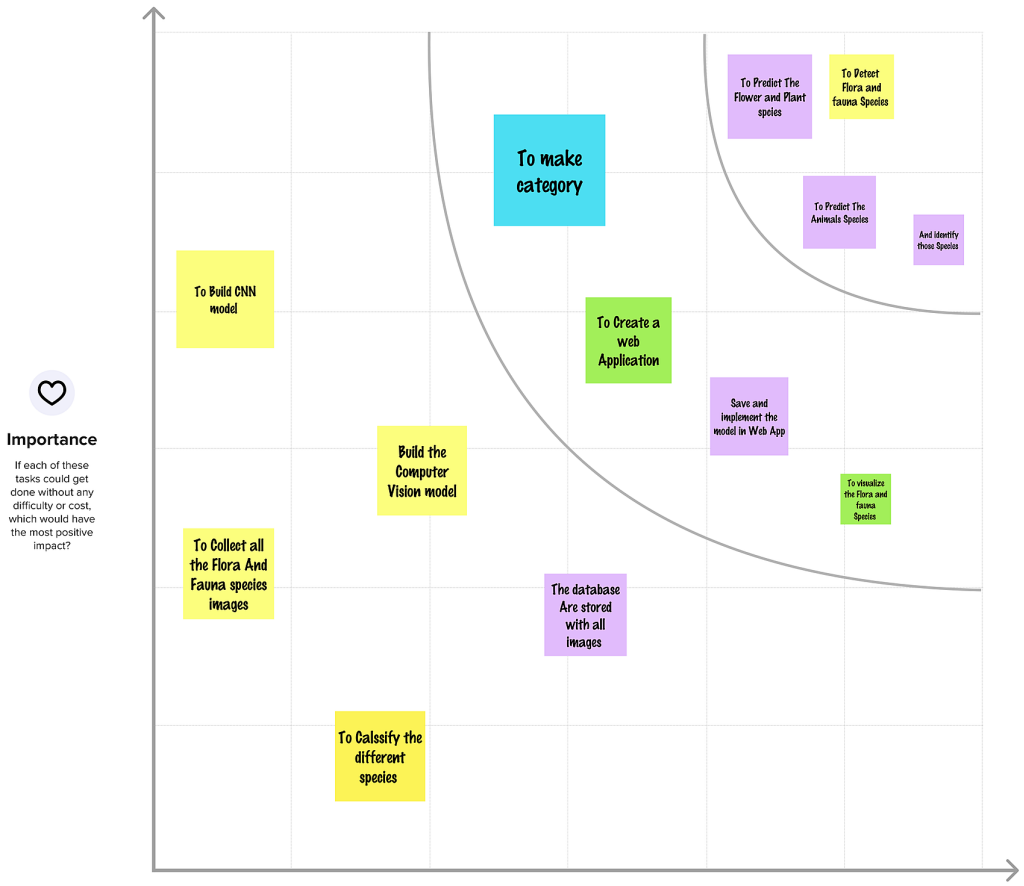
20 minutes

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



Importance

If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

Feasibility

Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

3.3 Proposed Solution

S.No	Parameter	Description
1)	Problem Statement (Problem to be solved)	i) How might we help both experienced and inexperienced user to identify species of plants and animals and their characteristics with related information? ii) Inexperienced users need to know about poisonous plants and dangerous animals so that they can stay away from it. iii) Both experienced and inexperienced users need to know about the medicinal values of a plant because they need to use it in case of emergencies. iv) All the users need to know about the rarity of the species of birds, animals or plants so that they can preserve and save it
2	Idea / Solution description	i) Display Botanical names ii) small description about them iii) Rarities of the species iv) What disease does the plant cure
3	Novelty / Uniqueness	i) Providing alerts based on if a species is harmful or not ii) Alerting the user on the rarity of the species iii) Gives the complete description about the species being viewed iv) If the plant being viewed has a medicinal value , it gives a description about it. v) Display the scientific name of the species.

S.No	Parameter	Description
4	Social Impact / Customer Satisfaction	Being able to identify the flora and fauna around us often leads to an interest in protecting wild spaces.
5	Business Model (Revenue Model)	i) Can make money through subscription based. ii) Partnership with many laboratories and scientists around the world
6	Scalability of the Solution	i) As the usage and user base of this application grows more feature can be added to the premium or subscription model. ii) We can introduce subscription models like free plan, business plan, educational plan and many more based on its usage iii) As the usage increase we can scale the application by releasing more languages based on the geographical usage.

3.4 Problem Solution Fit

roject Title: Digital Naturalist | **Project Design Phase-I - Solution Fit Template** | **Team ID:** PNT2022TMID36441

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

- Ornithologist
- Students
- Hikers
- Migrators
- Biologist
- Zoologist
- Tourister
- Research people

6. CUSTOMER CONSTRAINTS CC

- Network issues
- Insufficient knowledge about the biodiversity.
- Cannot remember all the basic life saving tips
- Making observations among species.

5. AVAILABLE SOLUTIONS AS

- Need to always carry a guidebook around everywhere
- Internet databases where we must search for certain species from the mountain of images from the web using modern algorithms.
- Usage of ai to tackle different complex difficulties in the wildlife.

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS J&P

- Unable to identify sub species of certain amphibians or birds.
- Cannot find a suitable place to work in the workplace
- Cannot find the exact habitat of certain species.

9. PROBLEM ROOT CAUSE RC

- complexities in identification
- Information gathering
- Need to depend on external resources
- Large dataset
- Money problem
- Depend upon Guide

7. BEHAVIOUR BE

- Volunteering for jobs where we can actively work with wildlife
- Finding rare and endangered species of flora and fauna and help them navigate in current

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS TR

- Save nature
- Save Endangered Species
- Expanding the lifespan of certain species through medicine
- Helps to gather aerial species away from places where they are prone to tower kill or other dangers

10. YOUR SOLUTION SL

- It can be in offline mode
- All information about the Species should be displayed.
- Medical Benefits of different plants can be displayed.
- Display alert messages for plants/animals
- Display alert messages for plants and animals.

8. CHANNELS of BEHAVIOUR CH

8.1 ONLINE

- Capture image and search it
- Browse using the internet

8.2 OFFLINE

- Hand notes
- Getting the information from experienced user

Identify strong TR & EM

4. EMOTIONS: BEFORE / AFTER EM

- Co2 to o2
- Imbalanced world to sustainable world
- Accumulation of waste to renewable energy

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

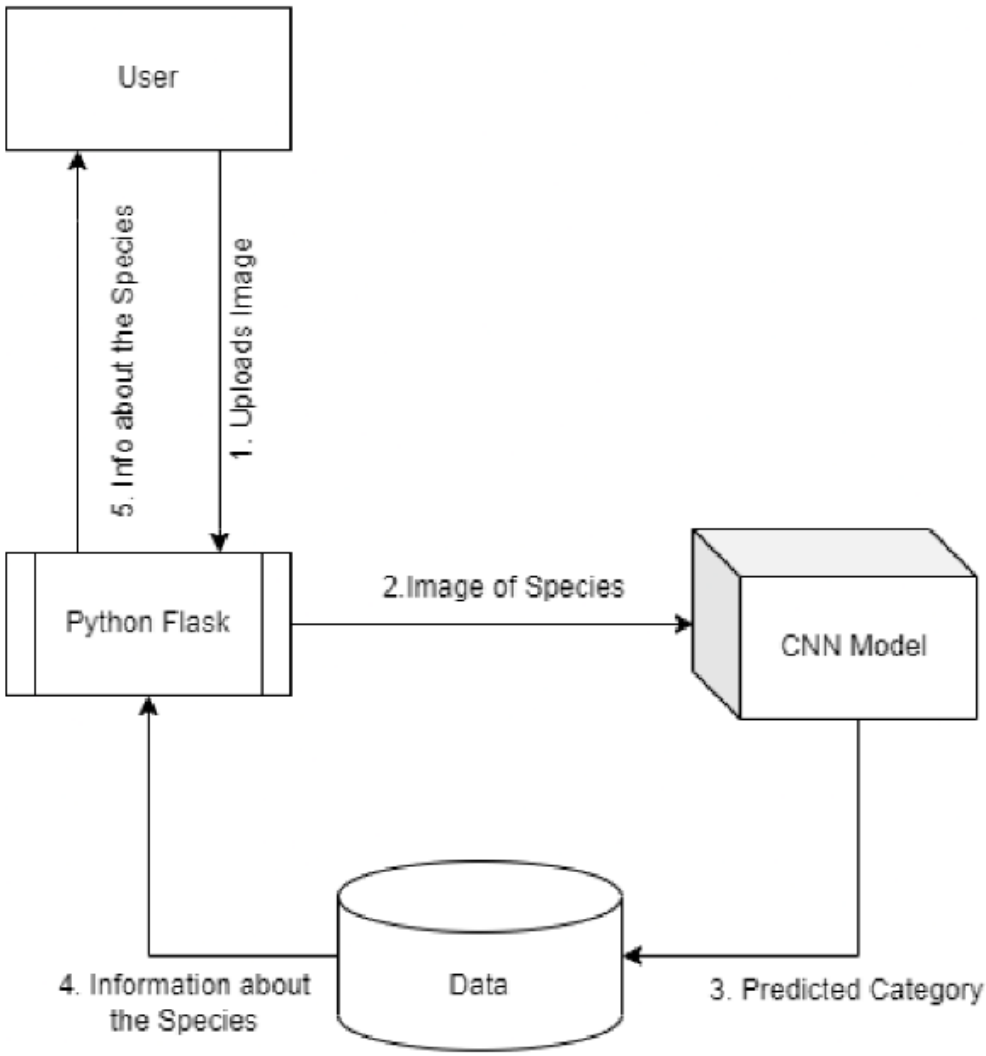
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	**Classification:**	It identifies the "class,"i.e., the category to which the image belongs. Note that an image can have onlyone class.
FR-2	**Tagging:**	It is a classification task with a higher degree of precision. It helps to identify several objects within an image.
FR-3	**Localization:**	It helps in placing the image in the given class and creates a bounding box around the object to show its location in the image
FR-4	**Detection:**	It helps to categorize the multiple objects in theimage and create a bounding box around it to locate each of them. It is a variation of the classification with localization tasks for numerous objects.
FR-5	**Semantic Segmentation:**	Segmentation helps to locate an element on an image to the nearest pixel.
FR-6	**Instance Segmentation:**	It helps in differentiating multiple objects belonging to the same class.

4.2 Non-Functional requirements

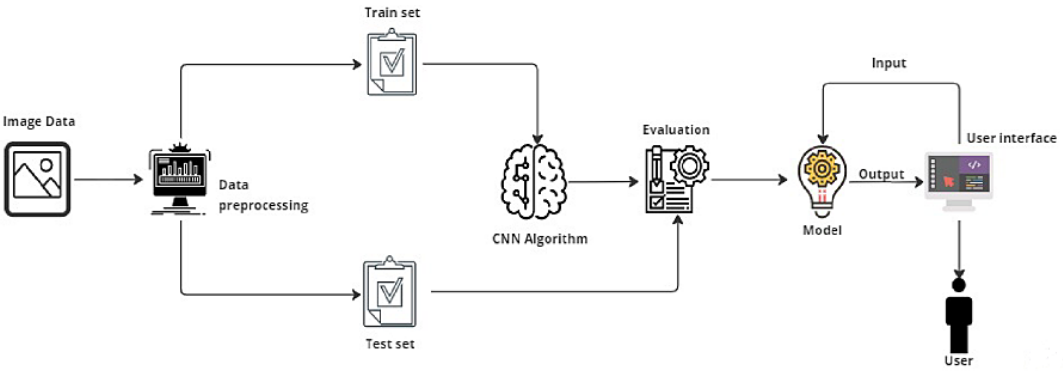
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	This tool verifies that usability is a special and important perspective to analyze user requirements, which can further improve the tool quality. In the model process with user experience as the core, the analysis of users' usability can indeed help designers better understand users 'potential needs, behavior and experience.
NFR-2	**Security**	By identifying the danger and poisoning flora and fauna. which the human become more secure from the attack byanimals.
NFR-3	**Reliability**	Training the model using deep learning makes the tools more efficient in order the recognition the image by this itbecome reliability.
NFR-4	**Performance**	The conventional computer vision approach of image recognition is a sequence of image filtering, segmentation, feature extraction, and rule-based classification. he images from the created dataset are fed into a neural network algorithm. This is the deep or machine learning aspect of creating an imagerecognition model. The training of an image recognition algorithm makes it possible for evolutional neural networks image recognition to identify specific classes.
NFR-5	**Availability**	By developing & deploying resilient tool we empower the user knowledge by knowing all kind of flora and fauna.
NFR-6	**Scalability**	By using this tool user understand about the particular thingwhen they don't have the knowledge in that thing, Which this software available 24/7 through online

5. PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture



5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)	Photo uploading	USN-1	The user can upload the picture of flora and fauna and get the detailed information of the species	I can upload pictures using dashboard	High	Sprint-1
Customer (Web user)	Predicting Species	USN-2	The detailed information of the species is displayed in the webpage	CNN model predicts the species	High	Sprint-2

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	S.Vasanth Kumar P.Dhanasekaran
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	B.Vasanth Kumar V.Shyam Sundhar
Sprint-1		USN-3	As a user, I can register for the application through Facebook	2	Low	V.Kumaran
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	V.Kumaran
Sprint-2	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	S.Vasanth Kumar P.Dhanasekaran
Sprint-2	Upload Design	USN-6	When a User Login Correct ,The Upload page will show for upload the predict Image.	2	High	S.Vasanth Kumar B.Vasanth Kumar

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Image Collection	USN-7	All The Flora and Fauna Image will collected from the Kaggle.com	1	High	V.Shyam Sundhar V.Kumaran
Sprint-3	Image Augmentation	USN-8	Augment all the Collected image	1	High	S.Vasanth Kumar P.Dhana Sekaran
Sprint-3	Load Data And Preprocessing	USN-9	Loading the data set and Preprocess The loaded data	1	High	B.Vasanth Kumar V.Shyam Sundhar
Sprint-3	Build The CNN model	USN-10	Build the CNN model for Prediction	1	High	S.Vasanth Kumar V.Kumaran
Sprint-3	Train and Test the Model	USN-11	Train and Test CNN model	1	High	B.Vasanth Kumar V.kumaran
Sprint-4	Evaluate and Save The Model	USN-12	Evaluate The Trained Model and save the model	2	Medium	S.Vasanth kumar
Sprint-4	Implement The Model	USN-13	Implement The Saved Model in Created web application using Flask	2	High	P.Dhana Sekaran
Sprint-4	Logout Design	USN-14	Using Html Create Logout Page	1	High	V.Shyam Sundhar V.Kumaran

6.2 Sprint Delivery Schedule

Project Tracker, Velocity & Burndown Chart: (4 Marks)

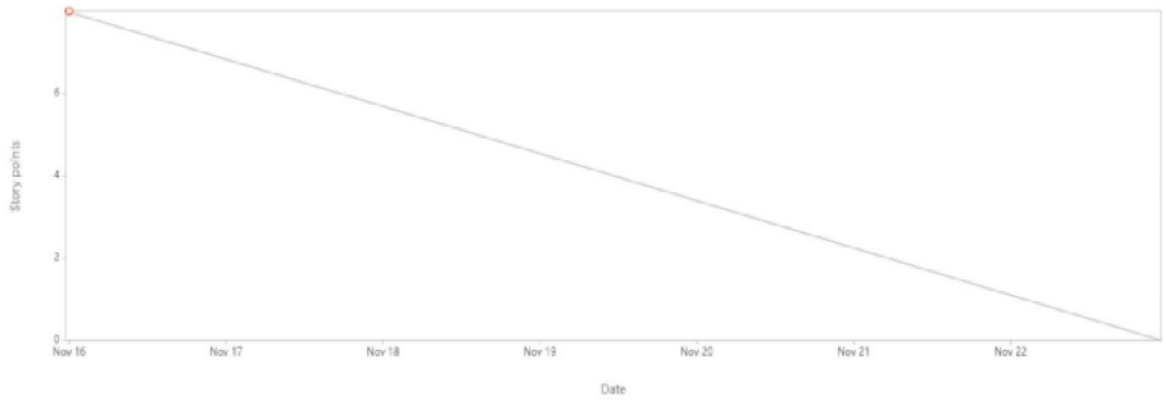
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022		
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022		
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022		

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

Burndown Chart:



7. CODING & SOLUTIONING