Project Report

INTRODUCTION

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.

Purpose :

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, and collecting and sharing information about the species we see on our travels is very useful for conversation groups like CNN.

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.

LITERATURE SURVEY

Existing Problem:

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.

Reference:

1. R. L. Siegel, K. D. Miller, and A. Jemal, "Cancer statistics, 2016", CA A Cancer Journal for Clinicians, vol. 66, no. 1, pp. 7-30, 2016. View at: Publisher Site Google Scholar

2. L. Fan, K. Strasser-Weippl. J.-J. Li et al., "Breast cancer in China." Lancet Oncology, vol. 15, no. 7,pp. c279-e289, 2014. View at: Publisher Site Google Scholar.

3. L. Tabar, A. Gad, L. H. Holmberg et al., "Reduction in mortality from breast cancer after mass screening with mammography." The Lancet, vol. 325, no. 8433, pp. 829-832, 1985. View at Google Scholar.

4. S. Yu, S. Wu, L. Zhuang et al., "Efficient segmentation of a breast in B-mode ultrasound tomography using three-dimensional Grab Cut (GC3D)," Sensors, vol. 17, no. 8, p. 1827, 2017. View at Publisher Site | Google Scholar.

5. R. Longo, F. Arfelli, R. Bellazzini et al., "Towards breast tomography with synchrotron radiationat Elettra; first images." Physics in Medicine and Biology, vol. 61, no. 4, pp. 1634-1649, 2016. View at: Publisher Site | Google Scholar.

Problem Statement Definition:

problem statement - 1

problem statement - 2

I am	I'm trying to	But	Because	Which makes me feel
Ayurvedic shopkeeper	selling of ayurvedic herbs and medicines	cant run the store in efficient manner	not having idea about some rare herbs	confused

problem statement - 3

I am	I'm trying to	But	Because	Which makes me feel
Archaeologist	finding of fossils and skull under the ground	It is tough to identify some skulls	not having idea about some animal skull	anxiety

problem statement - 4

I am	I'm trying to		Which makes me feel	
forest department	to protect commoners from animal attack	It is not an easy task to protect from animal attack	to identify the species with unclear picture from cctv	Scared

problem statement - 5

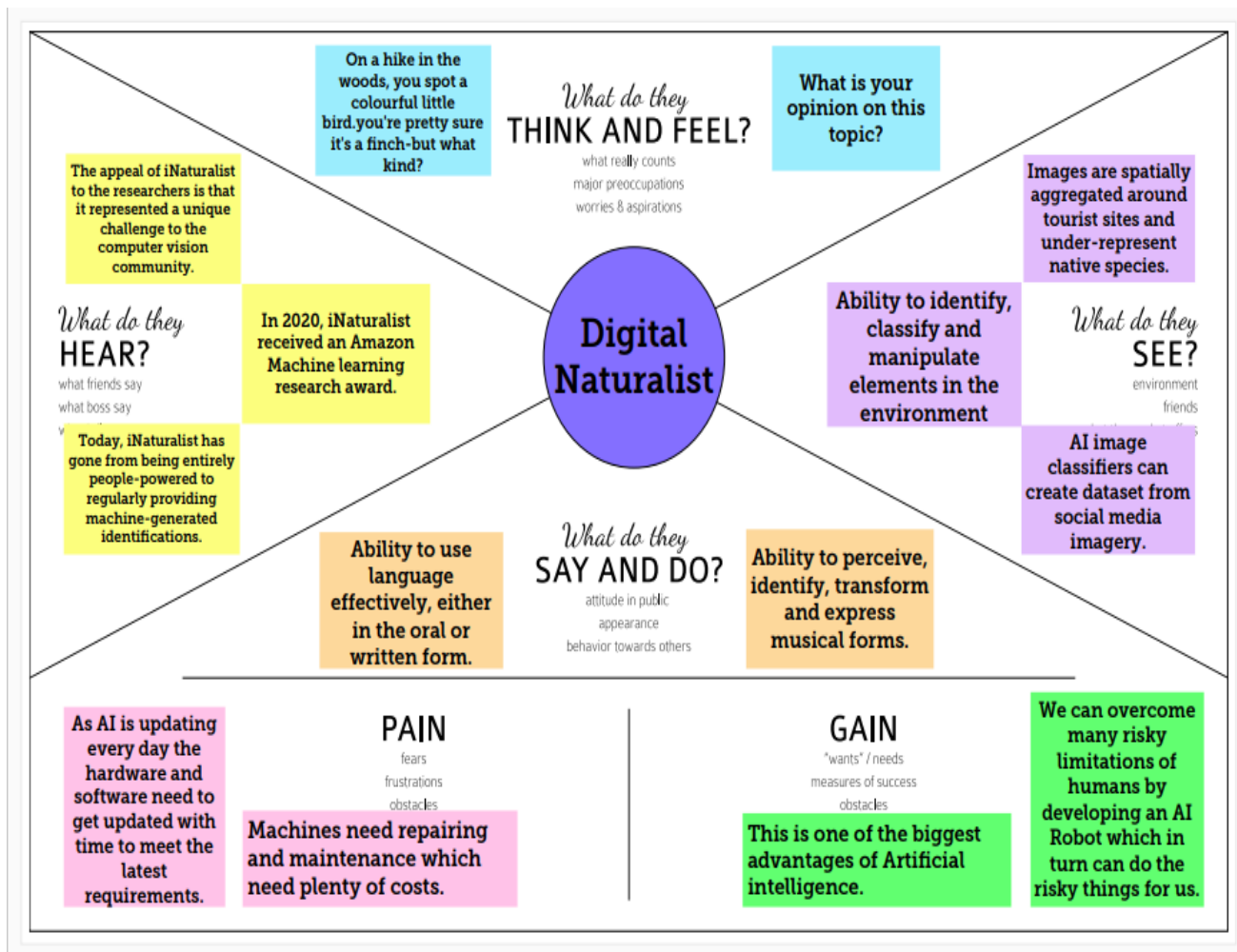| I am	I'm trying to		Which makes me feel	
professional terkker	used to trek over different forests	It is hard know the footprint of animal in the forest	lack of knowledge in animal footprint impression	panic

IDEATION AND PROPOSED SOLUTION

Empathy Map Canvas:

Proposed Solution :

Project Design Phase-I
Proposed Solution Template

Date	29 September 2022
Team ID	PNT2022TMID42355
Project Name	Digital Naturalist - AI Enabled tool for Biodiversity Researchers
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To build an efficient AI based image recognition tool which effectively to curb out the following constraints: • To capture the flora and fauna using the AI tool • To provide the information about the flora and fauna resp..
2.	Idea / Solution description	This system is built by using the Image/object recognition and classification using (CNN) Convolutional neural network. By using this system, we can capture the image of any animals and plants and can obtain the information about the flora and fauna at any time
3.	Novelty / Uniqueness	This AI powered chatbot gives a 24*7 efficient automated so that the service can be used anywhere and anytime. This system carries out the visualisations of the interpreted results. It also provides various information regarding the respective flora and fauna.
4.	Social Impact / Customer Satisfaction	The feasibility of implementing this idea is moderate neither easy nor tough because the system needs to satisfy the basic requirements of the customer as well as it should act as a bridge towards achieving high accuracy on predicting and analysing the image taken as input and to deliver the output with respective to the input image

5.	Business Model (Revenue Model)	By using this system, the users can predict and analyse the picture of the animals or plants. In which it results to the visualizing the description of the flora or fauna which taken as input.
6.	Scalability of the Solution	By implementing this system, the people can efficiently and effectively to gain knowledge about the nature they want and they wish to use at anytime. This system can also be integrated with the future technologies

Problem Solution fit:

Problem-Solution fit canvas 2.0

Digital naturalist AI enabled tool for biodiversity researchers

Define CS, fit into | **Focus on J&P, tap into BE, understand** | **Identify strong TR & EM**

1. CUSTOMER SEGMENT(S) — CS

- Archaeologist
- Ornithologist
- Entomologist
- Common people

6. CUSTOMER — CC

- **Anxiety**-customer began to get anxious when they still no idea about what they have found.
- **Mysteries**-they might Called it mysteries which they can't able to conclude it (founded thing) and give up.

5. AVAILABLE SOLUTIONS — AS

- By searching in books, e-books, online websites etc...
- By gathering the information from the peoples and come to understanding.

Explore AS,

2. JOBS-TO-BE-DONE / PROBLEMS — J&P

- Solving the customer doubts about the flora and fauna.
- Giving the necessary information for particular thing which needs for customer

9. PROBLEM ROOT CAUSE — RC

- Lack of study in the sequence of things
- Unaware of the object
- New to environment

7. BEHAVIOUR — BE

When the user Don't have the knowledge about particular thing (flora and fauna) this kind of situation occurs.

Focus on J&P, tap into BE, understand

3. TRIGGERS — TR

- Seeking for self-gratification by identity the thing
- To help peoples to get extra knowledge about the thing in (flora and fauna)

4. EMOTIONS: BEFORE / AFTER — EM

- **Before:** unease about something with an uncertain outcome (showing worry)
- **After:** pleasure of blessedness and brightness in face.

10. YOUR SOLUTION — SL

This system is built by using the image/object recognition and classification neural network. By using this system, we can capture the image of any animals and plants and can obtain the information about the flora and fauna at any time.

8. CHANNELS of BEHAVIOUR — CH

8.1 ONLINE

- Online websites
- Social media platforms

8.2 OFFLINE

- Customer throw words

Extract online & offline CH of BE

REQUIREMENT ANALYSIS

Functional requirement:

System : Pentium IV 2.4 GHz.

Hard Disk : 40 GB.

Ram : 512 Mb.

Non Functional Requirement :

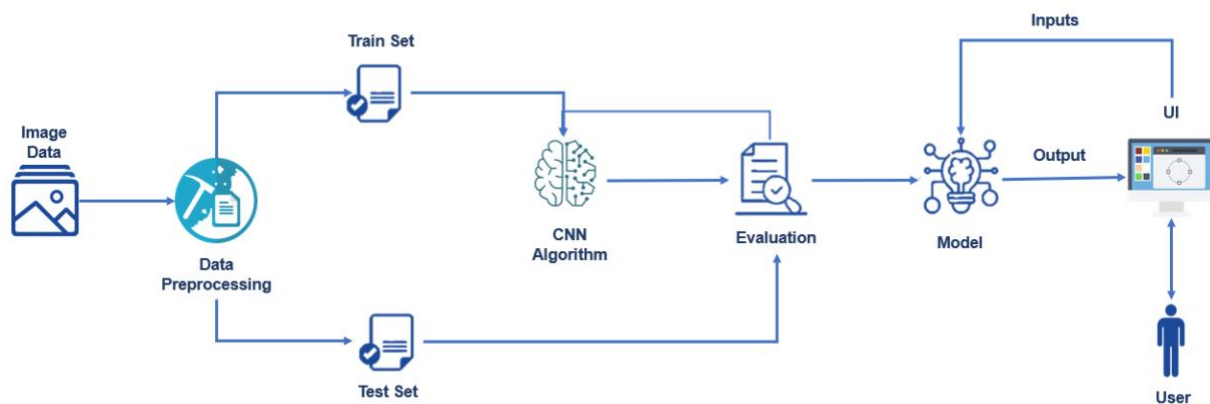   **Operating System :** Windows 7

    Coding Language : Python

PROJECT DESIGN

Data Flow Diagram, Solution & Technical Architecture:

PROJECT PLANNING & SCHEDULING

Sprint Planning & Estimation:

S.No	Milestone	Activities	Team Members
1.	Data Collection	Create Train and Test Folders	M. Rithick J. Praison

2.	Image Preprocessing	Import ImageDataGenerator Library and Configure	M. Vasanthakumar S. Prasath
3.	Image Preprocessing	Apply ImageDataGenerator functionality to Train and Test set	D. Ajaikumar S. Prasath
4.	Model Building	Import the required model building libraries	M. Vasanthakumar S. Prasath
5.	Model Building	Initialize the model	M. Rithick J. Praison
6.	Model Building	Add the convolution layer	D. Ajaikumar S. Prasath
7.	Model Building	Add the pooling layer	M. Vasanthakumar S. Prasath
8.	Model Building	Add the flatten layer	D.Ajaikumar M. Vasanthakumar
9.	Model Building	Adding the dense layers	M. Rithick J. Praison M. Vasanthakumar
10.	Model Building	Compile the model	D. Ajaikumar S. Prasath
11.	Model Building	Fit and save the model	M. Rithick J. Praison M. Vasanthakumar
12.	Test the Model	Import the packages and load the saved Model	D. Ajaikumar S. Prasath
13.	Test the Model	Load the test image, pre-process it and predict	M. Rithick J. Praison M. Vasanthakumar
14.	Application Building	Build a flask application	D.Ajaikumar M. Vasanthakumar

15.	Application Building	Build the HTML page	M. Rithick J. Praison M. Vasanthakumar
16.	Application Building	Output	D. Ajaikumar S. Prasath
17.	Train CNN Model on IBM	Register for IBM Cloud	M. Rithick J. Praison M. Vasanthakumar
18.	Train CNN Model on IBM	Train Image Classification Model	J. Praison M. Rithick

Sprint Delivery Schedule:

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1		USN-1	Data Collecting and digitalizing for analysing	3	Medium	RITHICK M
Sprint-1		USN-2	Adding more data to avoid overfitting	2	Medium	PRAISON J
Sprint-1	Modelling Phase	USN-3	Building a CNN model using the collected data	5	High	VASANTHAKUMAR M
Sprint-1		USN-4	Evaluating the model to check the accuracy and precision	3	High	PRASATH S

Sprint	Phase	USN	Functional Requirement		Priority	Team Member
Sprint-2	Development Phase	USN-5	Home page Creation – Shows the features of our application	1	Low	AJAIKUMAR D
Sprint-2		USN-6	Setting up facilities for user to feed the image	2	Medium	RITHICK M
Sprint-2		USN-7	Prediction page creation – shows prediction for the user given image	4	Medium	VASANTHAKUMAR M
Sprint-2		USN-8	Model loading – API creation using flask	5	High	PRAISON J
Sprint-3	Deployment Phase	USN-9	Integrating UI & backend – Connecting the front end and backend using API calls	3	Medium	PRASATH S
Sprint-3		USN-10	Cloud deployment – Deployment of application using IBM Cloud	5	High	AJAIKUMAR D
Sprint-4	Testing Phase	USN-11	Functional testing – Checking the scalability and robustness of the application	5	High	RITHICK M, PRAISON J
Sprint-4		USN-12	Non-Functional testing – Checking for user acceptance and integration	5	High	VASANTHAKUMAR M PRASATH S

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	13	6 Days	24 Oct 2022	29 Oct 2022	13	29 Oct 2022
Sprint-2	12	6 Days	31 Oct 2022	05 Nov 2022	12	05 Nov 2022
Sprint-3	8	6 Days	07 Nov 2022	12 Nov 2022	8	12 Nov 2022
Sprint-4	10	6 Days	14 Nov 2022	19 Nov 2022	10	19 Nov 2022

CODING & SOLUTIONING

Feature 1:

```python
from flask import Flask, redirect, render_template, request

app = Flask(_name_)

@app.route('/', methods=['GET'])
def index ():
```

```python
#Home page
return render_template("template.html")

@app.route('/predict', methods =['GET','POST'])
def upload ():
  # logic yet to be build
  if request.method == 'GET':
    return ("Here the logic is defined")
  if request.method == 'POST':
    return ("Here the logic is defined")
if_name_ == '_main_':
    app.run()
```

Features 2

```html
<!DOCTYPE html>
<html lang="en">

<head>
                                        <meta charset="UTF-8">
                                        <meta name="viewport"
content="width=device-width, initial-scale=1.0">
                                        <meta http-equiv="X-UA-
Compatible" content="ie=edge">
                                        <title>DIGITAL
NATURALIST</title>
                                        <meta name="description"
content="">
                                        <meta name="keywords"
content="">
                                        <link rel="icon"
type="image/x-icon" href="https://img.icons8.com/fluency/48/000000/natural-
food.png">
                                        <link
href="https://fonts.googleapis.com/css?family=Source+Sans+Pro:400,700"
rel="stylesheet">
                                        <link rel="stylesheet"
href="/static/style.css">
```

```html
</head>

<body class="leading-normal tracking-normal text-gray-900" style="font-family: 'Source Sans Pro', sans-serif;">

    <div class="h-screen pb-14 bg-right bg-cover">
        <!--Nav-->
        <div class="w-full container mx-auto p-6">

        </div>

        <!--Main-->
        <div class="container pt-24 md:pt-48 px-6 mx-auto flex flex-wrap flex-col md:flex-row items-center">

            <!--Left Col-->
            <div class="flex flex-col w-full xl:w-2/5 justify-center lg:items-start overflow-y-hidden">
                <h1 class="my-4 text-3xl md:text-5xl text-green-800 font-bold leading-tight text-center md:text-left slide-in-bottom-h1">

                    Digital Naturalist</h1>
                <p class="leading-normal text-base md:text-2xl mb-8 text-center md:text-left slide-in-bottom-subtitle">
                    An Artificial Intelligence powered tool for Bio-Diversity Researchers</p>

                <p class="text-blue-400 font-bold pb-8 lg:pb-6 text-center md:text-left fade-in">Trouble identifing a
```

animal,plant or bird,
Upload the picture
Sit back
Relax
We will find it

<!DOCTYPE html>
</p>
<div class="flex w-full justify-center md:justify-start pb-24 lg:pb-0 fade-in">
<form action="/predict" id="upload-file" method="post" enctype="multipart/form-data">

<input type="file" name="uploadedimg" id="uploadedimg" required accept=".jpg, .png, .jpeg, .gif, .bmp, .tif, .tiff|image/*" >

<input type="reset" value="Reset" class="upload">

<input type="submit" value="Upload" class="upload" onsubmit="check_file">

</form>
</div>
</div>

<!--Right Col-->
<div class="w-full xl:w-3/5 py-6 overflow-y-hidden">
<img class="w-5/6 mx-auto lg:mr-0 slide-in-bottom" src="https://i.ibb.co/vwhxYCg/animals.png">
</div>

<!--Footer-->
<div class="w-full pt-16 pb-6 text-sm text-center md:text-left fade-in">
<a class="text-gray-500 no-underline hover:no-underline"

href="https://github.com/IBM-EPBL/IBM-Project-30953-1660193242">© Digital Naturalist
                                              </div>

                                    </div>

                                    </div>

```html
<script>
document.getElementById("uploadedimg").addEventListener("change", validateFile)

function validateFile(){
  const allowedExtensions =  ['jpg','png'],
      sizeLimit = 1_000_000;
  const { name:fileName, size:fileSize } = this.files[0];
  const fileExtension = fileName.split(".").pop();
  if(!allowedExtensions.includes(fileExtension)){
    alert("Only image files - .jpg, .jpeg, .png, .tiff ");
    this.value = null;
  }else if(fileSize > sizeLimit){
    alert("file size too large")
    this.value = null;
  }
}</script>
</body>

</html>
```
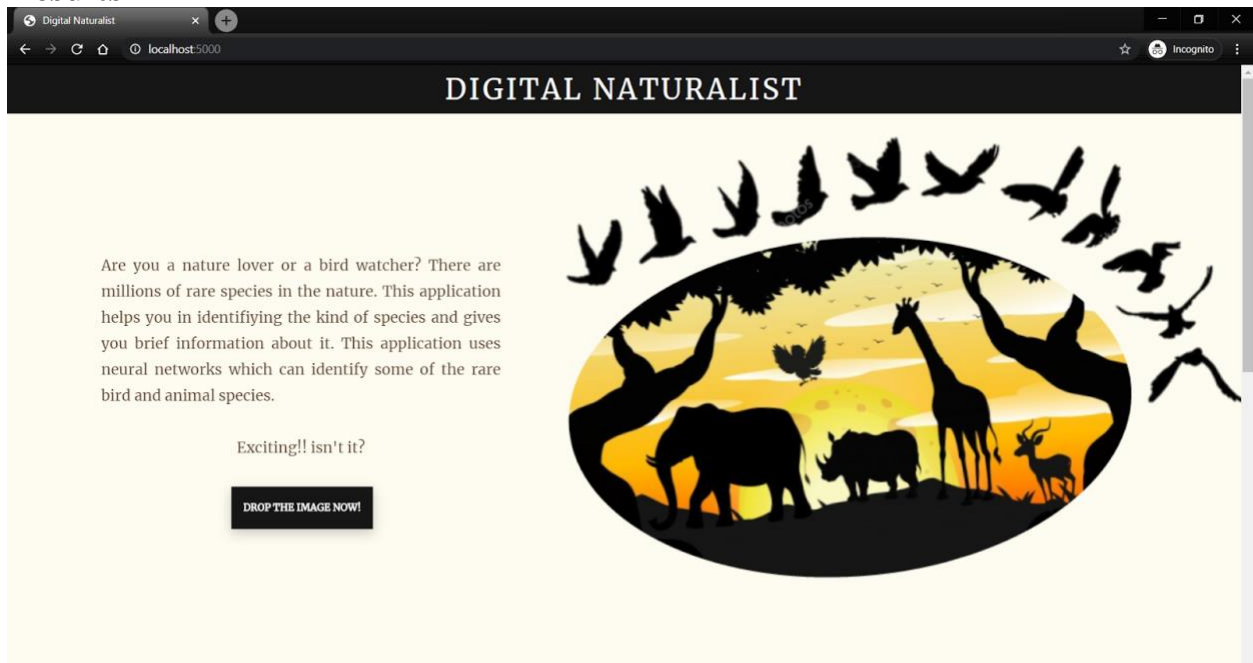
Results

DIGITAL NATURALIST

Click on choose and upload the image...

Upload your image

Choose...

Prediction: Lady's slipper, (subfamily Cypripedioideae), also called lady slipper or slipper orchid, subfamily of five genera of orchids (family Orchidaceae), in which the lip of the flower is slipper-shaped.

DIGITAL NATURALIST

Click on choose and upload the image...

Upload your image

Choose...

Prediction: The white deer found at Seneca Army Depot are a natural variation of the white-tailed deer (Odocoileus virginianus), which usually have brown coloring. The Seneca White Deer are leucistic, meaning they lack all pigmentation in the hair, but have the normal brown-colored eyes.

CONCLUSION:

That would overstate things. There is great diversity among naturalists, but some common ground too. All naturalisms 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 sciences.

SOURCE CODE :

```python
from flask import Flask, redirect, render_template, request

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    <meta http-equiv="X-UA-Compatible" content="ie=edge">
    <title>DIGITAL NATURALIST</title>
    <meta name="description" content="">
    <meta name="keywords" content="">
    <link rel="icon" type="image/x-icon" href="https://img.icons8.com/fluency/48/000000/natural-food.png">
    <link href="https://fonts.googleapis.com/css?family=Source+Sans+Pro:400,700" rel="stylesheet">
    <link rel="stylesheet" href="/static/style.css">

</head>


<body class="leading-normal tracking-normal text-gray-900" style="font-family: 'Source Sans Pro', sans-serif;">

    <div class="h-screen pb-14 bg-right bg-cover">
        <!--Nav-->
        <div class="w-full container mx-auto p-6">


        </div>

        <!--Main-->
```

```
<div class="container pt-24 md:pt-48 px-6 mx-auto flex flex-wrap flex-col md:flex-row items-center">

    <!--Left Col-->
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            Digital Naturalist</h1>
        <p class="leading-normal text-base md:text-2xl mb-8 text-center md:text-left slide-in-bottom-subtitle">
            An Artificial Intelligence powered tool for Bio-Diversity Researchers</p>

        <p class="text-blue-400 font-bold pb-8 lg:pb-6 text-center md:text-left fade-in">Trouble identifying a animal,plant or bird,<br>Upload the picture<br>Sit back<br>Relax<br>We will find it
            <!DOCTYPE html>
        </p>
        <div class="flex w-full justify-center md:justify-start pb-24 lg:pb-0 fade-in">
            <form action="/predict" id="upload-file" method="post" enctype="multipart/form-data">
                <input type="file" name="uploadedimg" id="uploadedimg" required accept=".jpg, .png, .jpeg, .gif, .bmp, .tif, .tiff|image/*" >
                <input type="reset" value="Reset" class="upload">
```

```html
                                              <input type="submit"
value="Upload" class="upload" onsubmit="check_file">

                                      </form>
                                                  </div>

                                      </div>

                                              <!--Right Col-->
                                              <div class="w-full
xl:w-3/5 py-6 overflow-y-hidden">
                                                      <img
class="w-5/6 mx-auto lg:mr-0 slide-in-bottom"
src="https://i.ibb.co/vwhxYCg/animals.png">

                                              </div>

                                              <!--Footer-->
                                              <div class="w-full
pt-16 pb-6 text-sm text-center md:text-left fade-in">
                                                      <a
class="text-gray-500 no-underline hover:no-underline"

                                              href="https://github.com/IBM
-EPBL/IBM-Project-30953-1660193242">&copy; Digital Naturalist</a>
                                              </div>

                                      </div>

                                      </div>

<script>
document.getElementById("uploadedimg").addEventListener("change",
validateFile)

function validateFile(){
  const allowedExtensions =  ['jpg','png'],
      sizeLimit = 1_000_000;
```

```
  const { name:fileName, size:fileSize } = this.files[0];
  const fileExtension = fileName.split(".").pop();
  if(!allowedExtensions.includes(fileExtension)){
    alert("Only image files - .jpg, .jpeg, .png, .tiff ");
    this.value = null;
  }else if(fileSize > sizeLimit){
    alert("file size too large")
    this.value = null;
  }
}</script>
</body>

</html>
```

GITHUB AND PROJECT DEMO LINK:

https://github.com/IBM-EPBL/IBM-Project-47524-1660800068