

Topic: Plant Analysis Tool using Gemini AI and Express.js Part 2

Speaker: Masyncntech | Notebook: Node.js (JavaScript) Projects



Previously, Gemini and Node.js have created the plant analysis for an uploaded image of a plant.

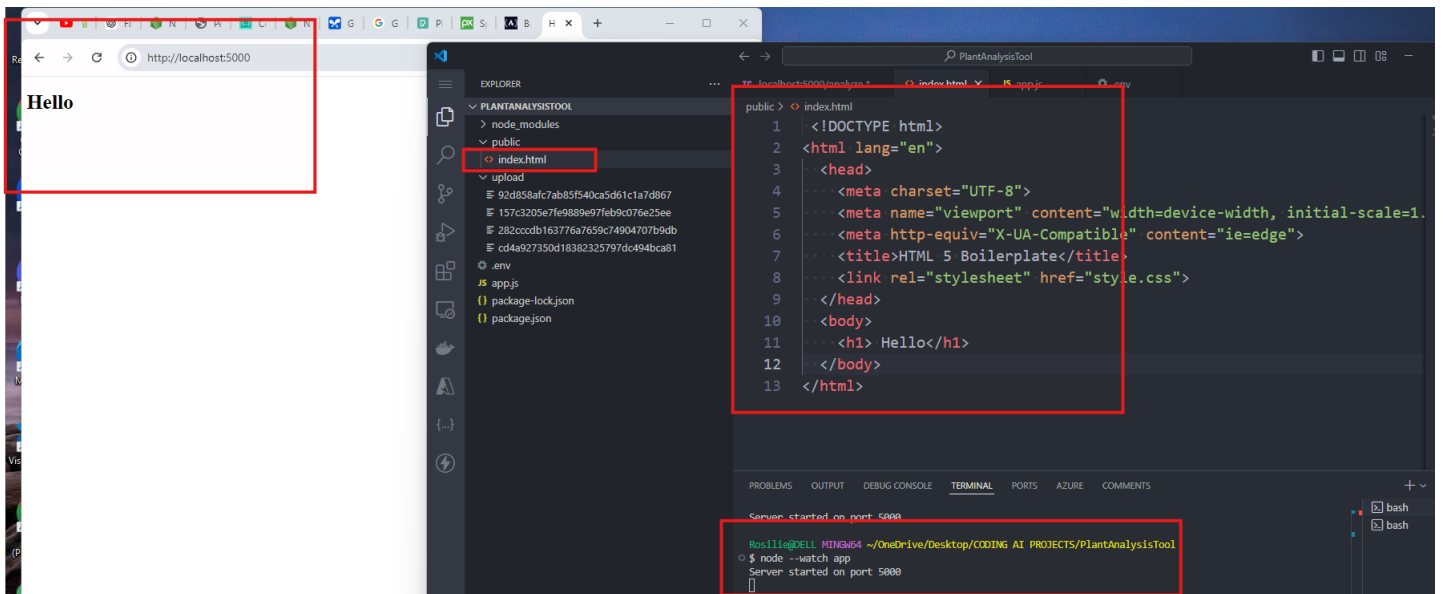
[GITHUB REPO](#)

REFERENCE: <https://github.com/tweneboah/Full-Stack-Web-Development-Bootcamp-Course/tree/main/PROJECTS/AI-PROJECTS/PLANT-ANALYSIS-TOOL/public>

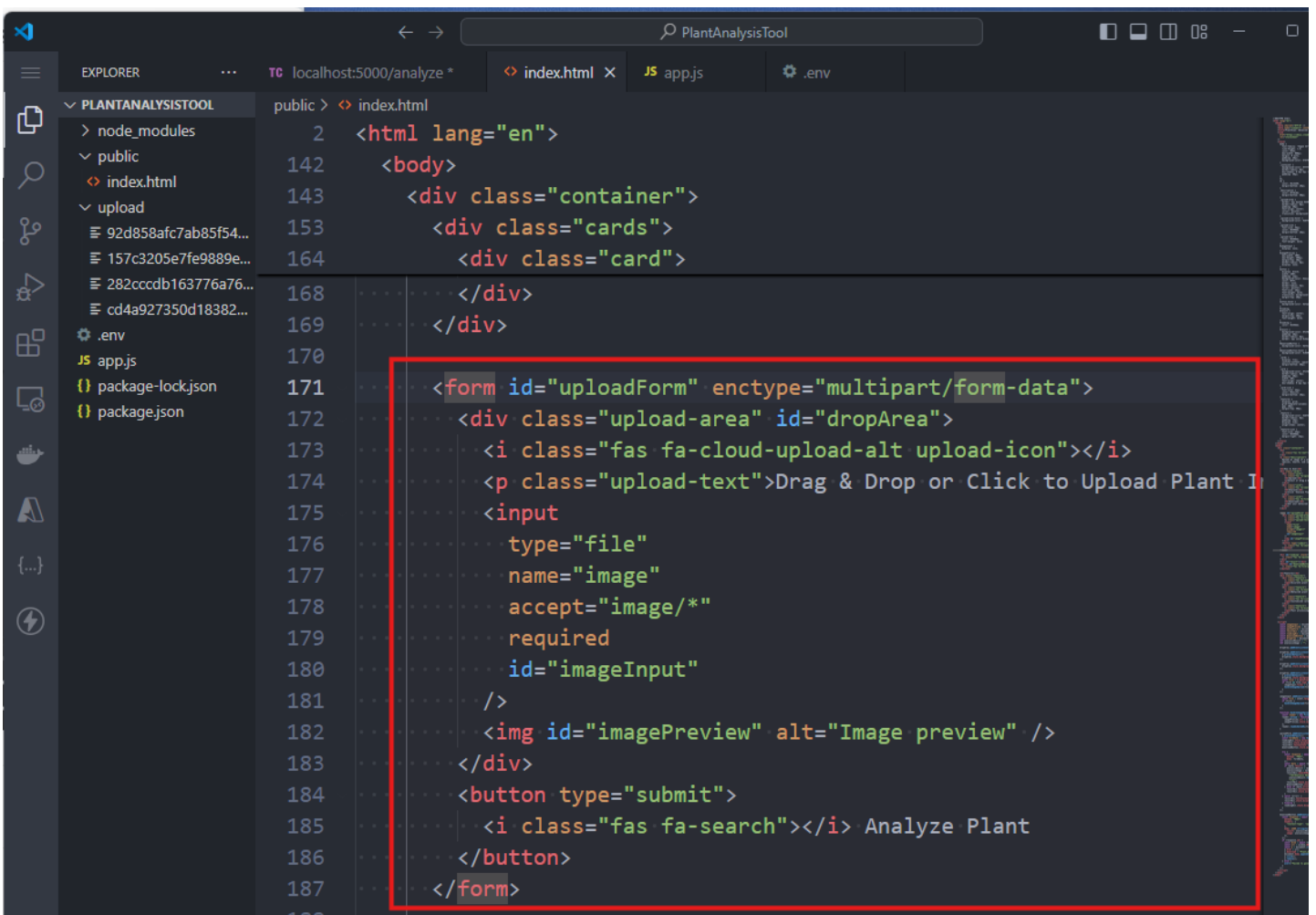
A screenshot of a Thunder Client interface showing a REST client request and response for a plant analysis tool. The interface is dark-themed. The top bar shows the URL 'http://localhost:5000/analyze' and the method 'POST'. The 'Body' tab is selected, showing a form field for 'image' with a 'Choose File' button. A file named 'philodendron-7960228_640.jpg' is selected. The 'Response' tab shows a JSON response with a 'results' field containing detailed text about the plant and an 'image' field with a base64-encoded image. A file explorer window is open in the foreground, showing the 'Downloads' folder with several image files, including the one selected in the Thunder Client.

```
1 {
2   "results": "The plant in the image is a Monstera deliciosa, also known as the Swiss cheese plant. This plant is native to tropical rainforests in Central America and is known for its large, glossy leaves with distinctive holes and slits. \n\nThe plant appears to be in good health. It has vibrant green leaves and no signs of pests, diseases, or other issues.\n\nHere are some instructions for Monstera deliciosa:\n\n**Light:** Monstera's prefer bright, indirect light. Avoid direct sunlight as it can burn the leaves.\n\n**Water:** Water the plant thoroughly when the top inch of soil is dry. Allow the soil to dry out slightly between waterings.\n\n**Humidity:** Monstera's thrive in humid environments. You can increase humidity by grouping plants together, using a humidifier, or placing a pebble tray filled with water near the plant.\n\n**Temperature:** Monstera's prefer warm temperatures between 65°F and 80°F.\n\n**Soil:** Use a well-draining potting mix.\n\n**Fertilizer:** Fertilize the plant every few weeks during the growing season with a balanced liquid fertilizer.\n\nHere are some interesting facts about Monstera deliciosa:\n\n**The holes and slits in the leaves are a form of adaptation that helps the plant to withstand strong winds.\n\n**The fruit of the Monstera deliciosa plant is edible and has a sweet, tropical flavor. However, it is important to note that the unripe fruit is toxic.\n\n**Monstera's are relatively easy to propagate from cuttings.\n\n**The plant can grow to be quite large, reaching heights of up to 18 feet.\n\nOverall, Monstera deliciosa is a popular house plant due to its striking appearance and relatively low maintenance requirements. With proper care, this plant can thrive indoors for many years.",
3   "image": "data:${req.file.mimetype};base64,${imageData}"
4 }
```

1. Now, create the front end for our project. Update our INDEX.HTML



2. The focus of INDEX.HTML shall be the form for UPLOADFORM



3. This is the code for UPLOAD using DRAG AND DROP OF IMAGE. INDEX.HTML is written as:

```
2 <html lang="en">
142 <body>
143 <div class="container">
216 </div>
217
218 <script>
219 <const imageInput = document.getElementById("imageInput");
220 <const imagePreview = document.getElementById("imagePreview");
221 <const uploadForm = document.getElementById("uploadForm");
222 <const resultDiv = document.getElementById("result");
223 <const loadingDiv = document.getElementById("loading");
224 <const downloadButton = document.getElementById("downloadButton");
225 <const dropArea = document.getElementById("dropArea");
226 <let analysisResult = "";
227 <let analysisImage = "";
228
229 <!-- Handle drag and drop events
230 <dropArea.addEventListener("click", () => imageInput.click());
231
232 <dropArea.addEventListener("dragover", (e) => {
233 <e.preventDefault();
234 <dropArea.style.backgroundColor = "#e8f4fd";
235 <});
236
237 <dropArea.addEventListener("dragleave", () => {
238 <dropArea.style.backgroundColor = "";
239 <});
240
241 <dropArea.addEventListener("drop", (e) => {
242 <e.preventDefault();
243 <dropArea.style.backgroundColor = "";
244 <const file = event.dataTransfer.files[0];
245 <if (file && file.type.startsWith("image/"))
246 <{
247 <imageInput.files = e.dataTransfer.files;
248 <handleImageUpload(file);
249 <};
250 <});
251
252 <dropArea.addEventListener("change", (event) => {
253 <const file = event.target.files[0];
254 <if (file){
255 <handleImageUpload(file);
256 <};
257 <});
258
```

4. This is the EVENT for UPLOAD BUTTON in INDEX.HTML:

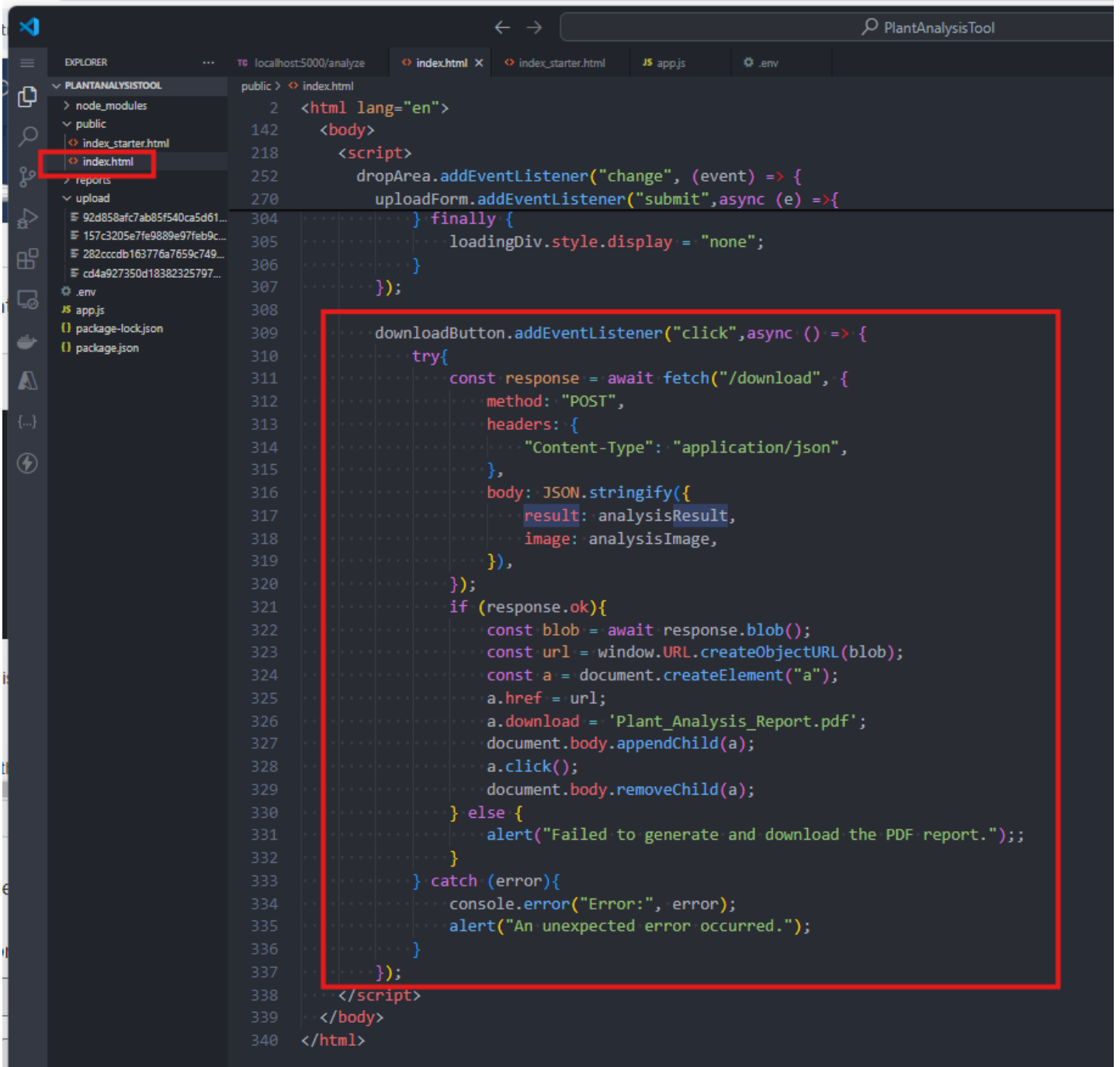
```
2 <html lang="en">
142 <body>
218 <script>
252   dropArea.addEventListener("change", (event) => {
260     function handleImageUpload(file){
267     }
268
269     //uploadForm Logic
270     uploadForm.addEventListener("submit", async (e) =>{
271       e.preventDefault();
272       const formData = new FormData(e.target)
273       loadingDiv.style.display = "block";
274       resultDiv.style.display = "none";
275       resultDiv.textContent = "";
276       downloadButton.style.display = "none";
277       try{
278         const response = await fetch('/analyze',{
279           method: "POST",
280           body: formData,
281         });
282         const data = await response.json();
283         if (data.result){
284           //retrieved from the apps.js json response
285           analysisResult = data.result;
286           analysisImage = data.image;
287           resultDiv.innerHTML =
288             "<h3>Analysis Result:</h3><p> " +
289             analysisResult.replace(/\n/g, "<br>") +
290             "</p>";
291           resultDiv.style.display = "block";
292           downloadButton.style.display = "block";
293           loadingDiv.style.display = "none";
294
295           } else if (data.error) {
296             resultDiv.textContent = "Error: " + data.error;
297             resultDiv.style.display = "block";
298           }
299
300         } catch (error){
301           resultDiv.textContent = "Error: " + error.message;
302           resultDiv.style.display = "block";
303
304         } finally {
305           loadingDiv.style.display = "none";
306         }
307       });
308
309     downloadButton.addEventListener("click", async () => {
```

The LOGIC is performed in APPS.JS:

```
1 require("dotenv").config();
2 const express = require("express");
3 const multer = require("multer");
4 const PDFDocument = require("pdfkit");
5 const fs = require("fs");
6 const fsPromises = fs.promises;
7 const path = require("path");
8 const { GoogleGenerativeAI } = require("@google/generative-ai");
9
10
11 const app = express();
12 const port = process.env.PORT || 5000;
13
14 // configure multer: save uploaded files to /upload folder & limit file file sizes
15 const upload = multer({ dest: "upload/" });
16 app.use(express.json({ limit: "10mb" }));
17
18 //initialize Google Generative AI
19 const genAI = new GoogleGenerativeAI(process.env.GEMINI_API_KEY);
20 app.use(express.static("public"));
```

```
18 // initialize google generative AI
19 const genAI = new GoogleGenerativeAI(process.env.GEMINI_API_KEY);
20 app.use(express.static("public"));
21
22
23 // routes
24 // analyze route and uses multer upload variable to save uploaded files as images
25 app.post("/analyze", upload.single("image"), async (req, res) => {
26   const file = req.file;
27   console.log(file); // use the image details for Gemini AI
28   try {
29     if (!req.file) {
30       return res.status(400).json({ error: "Please upload an image" });
31     }
32     const imagePath = req.file.path;
33     const imageData = await fsPromises.readFile(imagePath, {
34       encoding: "base64",
35     });
36     // use the gemini AI API to analyze the image
37     const model = genAI.getGenerativeModel({
38       model: "gemini-1.5-flash",
39     });
40     const result = await model.generateContent([
41       "Analyze this plant image and provide detailed analysis of its species, health and care recommendations, its characteristics, care",
42     ]);
43     const {
44       inlineData: {
45         mimeType: req.file.mimetype,
46         data: imageData,
47       },
48     } = result;
49     const plantInfo = result.response.text();
50     // remove the uploaded image
51     await fsPromises.unlink(imagePath);
52     // respond with the analysis result and the image data
53     res.json({
54       result: plantInfo,
55       image: `data:${req.file.mimetype};base64,${imageData}`,
56     });
57   } catch (error) {
58     console.error("Error analyzing image:", error);
59     res.status(500).json({ error: "An error occurred while analyzing the image." });
60   }
61 });
```

5. This is the code for DOWNLOAD REPORT in INDEX.HTML



```
2 <html lang="en">
142 <body>
218 <script>
252     dropArea.addEventListener("change", (event) => {
270         uploadForm.addEventListener("submit", async (e) =>{
304             ... } finally {
305                 ... loadingDiv.style.display = "none";
306             ... }
307         });
308
309         downloadButton.addEventListener("click", async () => {
310             try{
311                 const response = await fetch("/download", {
312                     method: "POST",
313                     headers: {
314                         "Content-Type": "application/json",
315                     },
316                     body: JSON.stringify({
317                         result: analysisResult,
318                         image: analysisImage,
319                     }),
320                 });
321                 if (response.ok){
322                     const blob = await response.blob();
323                     const url = window.URL.createObjectURL(blob);
324                     const a = document.createElement("a");
325                     a.href = url;
326                     a.download = 'Plant_Analysis_Report.pdf';
327                     document.body.appendChild(a);
328                     a.click();
329                     document.body.removeChild(a);
330                 } else {
331                     alert("Failed to generate and download the PDF report.");
332                 }
333             } catch (error){
334                 console.error("Error:", error);
335                 alert("An unexpected error occurred.");
336             }
337         });
338     </script>
339 </body>
340 </html>
```

This is the logic in APPS.JS

```
67 app.post("/download", express.json(), async (req, res) => {
68   //res.json({ success: true });
69   const { result, image } = req.body;
70   try {
71     // Ensure the reports directory exists
72     const reportsDir = path.join(__dirname, "reports");
73     await fsPromises.mkdir(reportsDir, { recursive: true });
74     //generate the pdf report
75     const filename = `plant_analysis_report_${Date.now()}.pdf`;
76     const filePath = path.join(reportsDir, filename);
77     const writeStream = fs.createWriteStream(filePath);
78     const doc = new PDFDocument();
79     doc.pipe(writeStream);
80
81     //Add content to the PDF
82     doc.fontSize(24).text("Plant Analysis Report", { align: "center" });
83     doc.moveDown();
84     doc.fontSize(14).text(`Date Generated: ${new Date().toLocaleDateString}`);
85     doc.moveDown();
86     doc.fontSize(14).text(result, { align: "left" });
87
88     // Insert image to the PDF
89     if (image) {
90       const base64Data = image.replace(/^data:image\/\w+;base64/, "");
91       const buffer = Buffer.from(base64Data, "base64");
92       doc.moveDown();
93       doc.image(buffer, {
94         fit: [500, 300],
95         align: "center",
96         valign: "center",
97       });
98     }
99     doc.end();
100    // wait for the pdf to be created
101    await new Promise((resolve, reject) => {
102      writeStream.on("finish", resolve);
103      writeStream.on("error", reject);
104    });
105    res.download(filePath, (err) => {
106      if (err) {
107        console.log(err);
108        res.status(500).json({ error: "An error occurred while generating the PDF." });
109      }
110      fsPromises.unlink(filePath);
111    });
112  } catch (error) {
113    console.error("Error generating PDF:", error);
114    res.status(500).json({ error: "An error occurred while generating the PDF." });
115  }
116 });
```

6. When we run our code, type this in your terminal:

```
$ node --watch app
```

```
316 body: JSON.stringify({
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS AZURE COMMENTS
Server started on port 5000
Rosilie@DELL MINGW64 ~/OneDrive/Desktop/CODING AI PROJECTS/PlantAnalysisTool
$ node --watch app
Server started on port 5000
█
```




When you run in your browser:


→ <http://localhost:5000>


PlantScan: Advanced Plant Analysis Tool

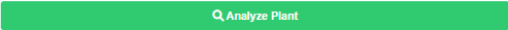
Upload an image of a plant to receive a detailed analysis of its species, health, and care recommendations.

How to Use

 Upload Select or drag & drop a plant image	 Analyze Click 'Analyze Plant' to process the image	 Download Get your detailed PDF report
---	---	--


Drag & Drop or Click to Upload Plant Image





Analysis Result:

The plant in the image is an air plant, specifically a Tillandsia ionantha, also known as the Pink Quill. It is a popular choice for indoor plant enthusiasts due to its ease of care and unique appearance.

Health: The plant appears to be healthy and well-hydrated. The leaves are a vibrant green, and there are no signs of pests or diseases.

Care Recommendations:

- Light:** Bright indirect light is best. Avoid direct sunlight as it can burn the leaves.
- Water:** Water your air plant by soaking it in a bowl of room temperature water for 30 minutes once a week. Allow the plant to completely dry before returning it to its pot.

→ <http://localhost:5000>

Analysis Result:

The plant in the image is an air plant, specifically a Tillandsia ionantha, also known as the Pink Quill. It is a popular choice for indoor plant enthusiasts due to its ease of care and unique appearance.

Health: The plant appears to be healthy and well-hydrated. The leaves are a vibrant green, and there are no signs of pests or diseases.

Care Recommendations:

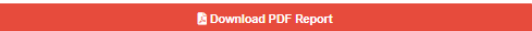
- Light:** Bright indirect light is best. Avoid direct sunlight as it can burn the leaves.
- Water:** Water your air plant by soaking it in a bowl of room temperature water for 30 minutes once a week. Allow the plant to completely dry before returning it to its pot.
- Humidity:** Air plants prefer moderate humidity. If your home is dry, you can mist the plant regularly.
- Fertilizer:** You can fertilize your air plant every few weeks with a diluted liquid fertilizer.
- Potting:** While air plants are epiphytes (meaning they do not need soil), they often look attractive when displayed in a pot. You can use a decorative pot with drainage holes and a base of gravel or stones for support.

Characteristics:

- Appearance:** The leaves are narrow, pointed, and grow in a rosette formation. The leaves can turn a vibrant pink color when they are about to bloom.
- Size:** Tillandsia ionantha can grow up to 6 inches tall and wide.
- Flowers:** The pink quill produces small, pink flowers in the center of the rosette. The flowers are short-lived, but the pink coloration of the leaves can persist for several weeks.

Interesting Facts:

- Air plants are epiphytes, meaning they grow on other plants for support.
- Air plants absorb moisture and nutrients from the air through their leaves.
- Air plants are native to the tropical and subtropical regions of the Americas.
- The Pink Quill is known for its beautiful pink coloration, which is more pronounced when the plant is about to bloom.
- Air plants are relatively easy to care for, making them an excellent choice for beginner plant owners.



Features

See the attached PDF for its sample output.

When we run our app and upload an image for plant analysis, we show our JSON data in our terminal:

```
const genAI = new GoogleGenerativeAI(process.env.GEMINI_API_KEY);
app.use(express.static("public"));

// routes
// analyze route and uses multer upload variable to save uploaded files as images
app.post("/analyze", upload.single("image"), async (req, res) => {
  const file = req.file;
  console.log(file); //use the image details for Gemini AI
  try {
    if (!req.file) {
      return res.status(400).json({ error: "Please upload an image" });
    }
  }
});
```

```
Rosilie@DELL MINGW64 ~/OneDrive/Desktop/CODING AI PROJECTS/PlantAnalysisTool
$ node --watch app
Server started on port 5000
{
  filename: 'image',
  originalname: 'pastel-4279379_640.jpg',
  encoding: '7bit',
  mimetype: 'image/jpeg',
  destination: 'upload/',
  filename: '688156e909372f60a949e61142711b4b',
  path: 'upload\\688156e909372f60a949e61142711b4b',
  size: 62257
}
```

We uninstall NODE.JS after this project to give way to Django projects.