Botaniq

"Your Smart Garden Companion"

A
Project Report submitted in partial
fulfillment of the requirements for the
award of the degree of

Bachelor of Technology in Computer Science & Engineering

By

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CANDIDATE'S DECLARATION

I/We hereby certify that the project work entitled "Botaniq - Your Smart Garden Companion " in partial fulfilment of the requirements for the award of the Degree of **BACHELOR OF TECHNOLOGY in COMPUTER SCIENCE AND ENGINEERING**
 with specialization in
Artificial Intelligence and Machine Learning and submitted to the Department of Systemics, School of Computer Science, University of Petroleum & Energy Studies, Dehradun, is an authentic record of my / our work carried out during a period from Jan 2025 to Present under the supervision Dr. Amit Ranjan.

The matter presented in this project has not been submitted by us for the award of any other degree of this or any other University.

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This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Dr. Amit Ranjan

ACKNOWLEDGEMENT

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1 Introduction

1.1 Background Information

Many plant enthusiasts and home gardeners experience a sense of isolation and overwhelm when confronted with the plethora of conflicting information about plant care. The vast amount of generic advice available online often leaves them feeling uncertain about the precise needs of their plants, whether it's the correct balance of water, sunlight, or nutrients. This lack of personalized guidance not only undermines their confidence but also transforms what should be a fulfilling hobby into a source of stress and anxiety.

Furthermore, the traditional practices that connect individuals with their cultural heritage—such as Vastu Shastra—are frequently overlooked in modern plant care resources. For many, the integration of ancient wisdom with contemporary plant care practices is essential for creating a harmonious living environment. The emotional impact of this disconnect can be profound, as individuals struggle to create spaces that not only nurture their plants but also contribute to their overall well-being.

Botaniq is conceived against this backdrop of emotional and practical challenges. Recognizing the deep-seated need for both reliable information and a sense of reassurance, Botaniq aims to bridge the gap by offering an AI-powered solution that delivers personalized plant care guidance alongside traditional Vastu insights.

Ultimately, Botaniq is more than just a tool for plant identification; it is envisioned as a companion that empowers users, alleviates the burden of uncertainty, and fosters a nurturing bond with nature. This holistic approach not only ensures that plants receive the care they need but also helps users reclaim the joy and tranquility that comes from cultivating a vibrant, harmonious living space.

1.2 Problem Statement

1. **Accurate Plant Identification:**
   Many users struggle with identifying plant species accurately from photos, leading to confusion and misapplication of care instructions.
2. **Personalized Plant Care Guidance:**
   Generic, one-size-fits-all advice on plant care often leaves users unsure about the precise requirements of their individual plants.
3. **Holistic Integration of Traditional and Modern Wisdom:**
   There is a significant gap in resources that combine modern plant care practices with traditional insights such as Vastu Shastra and herbal benefits.

Many plant enthusiasts struggle with identifying plant species accurately and providing the right care due to scattered, generic, and often conflicting information. This leads to uncertainty, improper plant care, and frustration. Additionally, traditional wisdom like Vastu insights and herbal benefits are often overlooked, leaving a gap between modern plant care and holistic well-being.

Botaniq solves this by offering an AI-powered solution that identifies plants from images and provides personalized care guidance, Vastu significance, and wellness insights. By combining technology with traditional wisdom, Botaniq helps users confidently nurture their plants while fostering a deeper connection with nature.

1.3 Main Objectives

By blending modern technology with traditional wisdom, Botaniq empowers users to nurture their plants confidently while creating a harmonious living environment.

1. **Accurate Plant Identification:**
   Utilize AI-powered image recognition through the Pl@ntNet API to accurately identify plant species from user-uploaded images.
2. **Personalized Plant Care Guidance:**
   Provide tailored recommendations on watering, sunlight, fertilizers, and general plant maintenance to ensure optimal plant health.
3. **Integration of Traditional Wisdom:**
   Offer insights on Vastu Shastra and herbal benefits, helping users align their plant choices with well-being and home harmony.
4. **Interactive AI Chatbot:**
   Enable users to engage in natural conversations with an AI chatbot powered by GPT via LangChain for instant, customized plant-related advice.
5. **User-Friendly & Accessible Platform:**
   Develop an intuitive, easy-to-use interface that allows seamless plant identification, guidance retrieval, and chatbot interaction for all users.

1.4 Charts

USE CASE

Actors in BOTANIQ

- User – Uploads plant images, receives care insights, and interacts with the AI chatbot.
- Database System – Stores plant data, user interactions, and recommendations.
- Admin – Manages and updates the system.

Use Case Functions

- Plant Identification: User uploads an image, AI identifies the plant, and displays details.
- Personalized Care: Provides tailored guidance on watering, sunlight, and fertilizers.
- Vastu & Wellness Insights: Suggests ideal placement and health benefits.
- Chatbot Assistance: Answers plant-related queries in real-time.
- User Feedback: Collects input to improve AI responses.
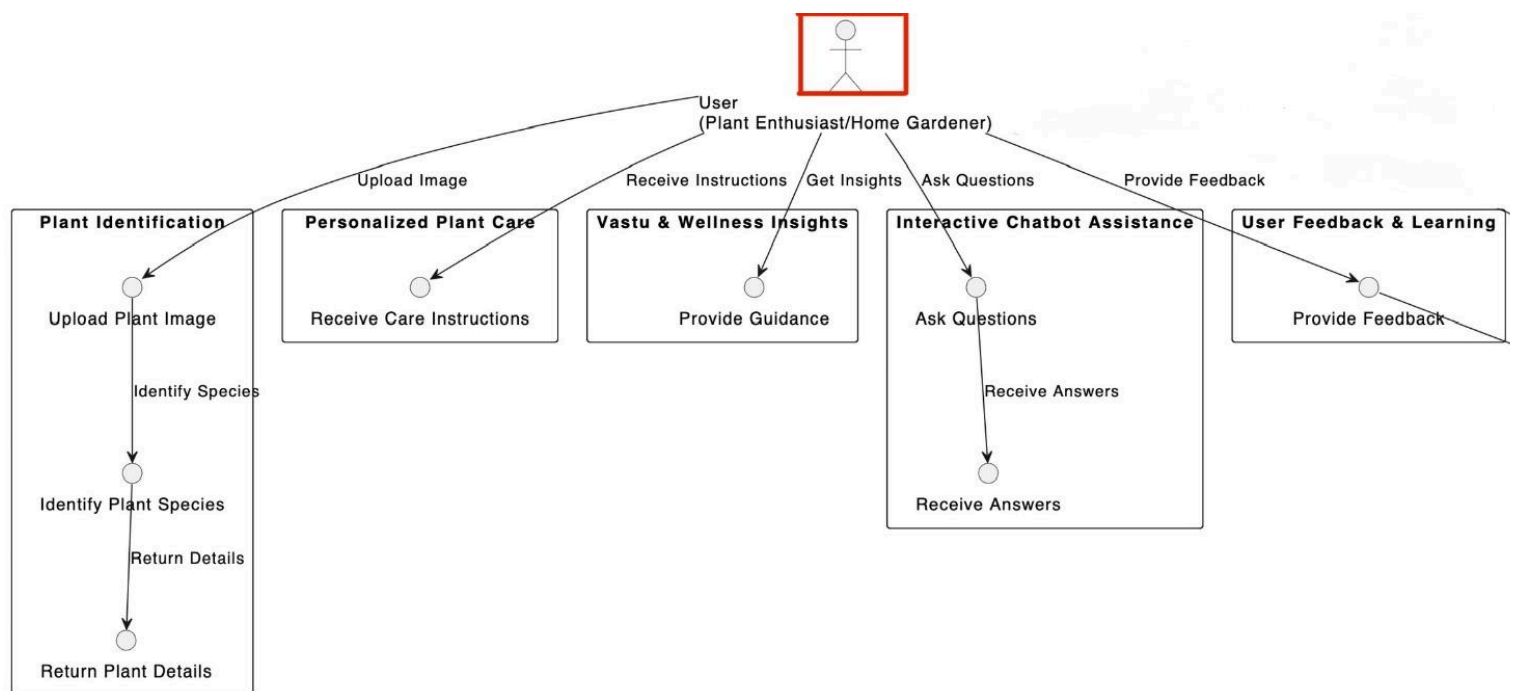
Flowchart of Events
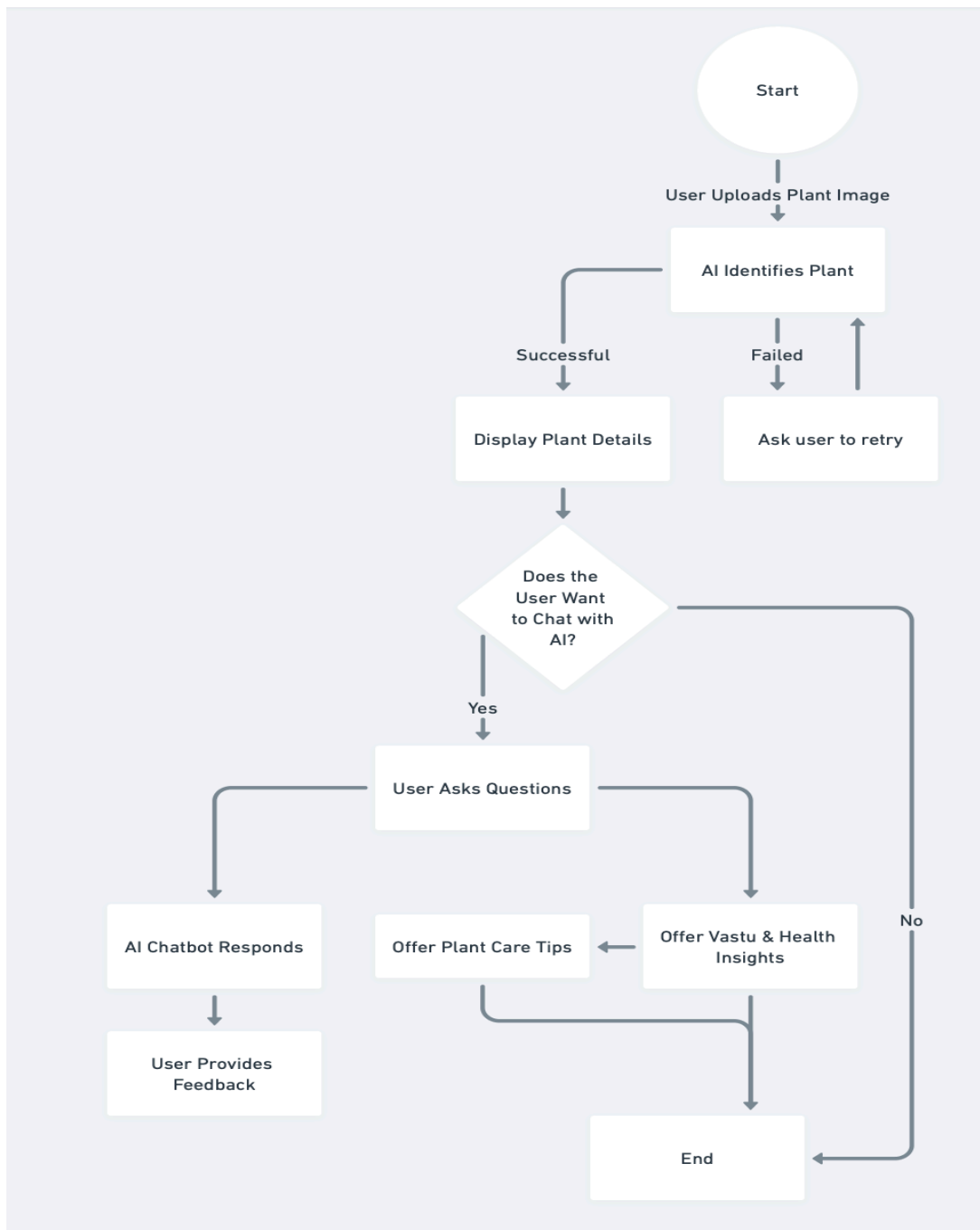
2.Implementation

2.1 Technology Stack

1. Frontend

- React.js for building the UI.

- React Context API for state management.

- Tailwind CSS for styling.

- Fetch API for API calls.

2. Backend

- FASTAPI for handling API requests.

- MongoDB as the primary database (if needed for storing user interactions).

- Pl@ntNet API for plant identification (directly uploading images and retrieving responses).

3. AIML Integration

- YOLO for image segmentation and recognition

- GPT API for chatbot processing and plant-related queries.

4. Authentication

- JWT (JSON Web Tokens) for secure authentication.

- Bcrypt for password hashing.

2.2 Dataset And Input Format

Dataset

• Plant Identification (via API): Image uploaded → Returns species name, scientific name, and confidence score.

• Alternative Dataset (Oxford102): Can be used but may require high processing power.

• Chatbot Responses: Query ID, User ID, Question, AI Response.

Input Format

• User Registration: { "email": "user@example.com", "password": "hashed" }

• Plant Image Identification: { "user_id": "UUID", "image": "base64_encoded_string" }

• Chatbot Query: { "user_id": "UUID", "query": "text" }

2.3 Area of Application

1. **Home Gardening & Plant Care**
   ○ Assists plant enthusiasts in maintaining healthy indoor and outdoor plants.
   ○ Provides customized care instructions for watering, sunlight, and fertilizers.
2. **Vastu**
   ○ Suggests ideal plant placements based on Vastu principles to enhance positive energy.
   ○ Recommends plants that bring prosperity, health, and harmony to homes.
3. **Health & Wellness**
   ○ Educates users about the medicinal benefits of various herbs and plants.
   ○ Identifies air-purifying plants that improve indoor air quality.
4. **Education & Awareness**
   ○ Serves as a learning tool for students, botanists, and plant enthusiasts.
   ○ Helps users identify and understand plant species with AI-powered insights.
5. **Retail & E-commerce Integration**
   ○ Enhances online plant-selling platforms by offering instant plant identification.
   ○ Provides buyers with care instructions and safety guidelines before purchase.
6. **Smart Homes & AI Assistants**
   ○ Can be integrated with voice assistants like Alexa or Google Assistant.
   ○ Enables hands-free plant care advice and reminders for watering and fertilization.

2.4 Related Works

1. **Pl@ntNet** – A plant identification app that allows users to upload images and get species details. BOTANIQ enhances this by integrating personalized plant care, Vastu insights, and chatbot assistance.
2. **PictureThis** – An AI-powered plant identification and care app. Unlike PictureThis, BOTANIQ focuses on interactive AI chat for real-time assistance and Vastu benefits.
3. **Flora Incognita** – A research-based plant identification tool used for ecological studies. BOTANIQ extends this concept to home gardening, wellness, and smart plant care.

4. **SmartPlant** – A gardening app that connects users with plant experts for personalized advice. BOTANIQ automates this with an AI chatbot, reducing the need for human intervention.

5. **Google Lens (Plant Identification Feature)** – Identifies plants using image recognition. BOTANIQ differentiates itself by offering care tips, health benefits, and environmental suitability beyond basic identification.

2.5 Work Done Until Now

1. **Dataset Preparation & Cleaning**
   We have finalized the dataset and started cleaning it to ensure it meets our project's needs. This includes filtering out unnecessary data, handling missing values, and structuring it for seamless integration with our AI model.

2. **Prototype & UI Design**
   The overall structure and design of the user interface have been defined. We have created wireframes and planned the user journey to ensure a smooth and intuitive experience. The UI focuses on simplicity and ease of use, making plant identification and care guidance easily accessible.

3. **Frontend Development**
   We have started working on the frontend. Initial components, such as the homepage and image upload functionality, are being developed.

3. SWOT Analysis

Strengths

1. **Conversational Interface**
   BOTANIQ features an interactive chatbot that enhances user engagement by providing a seamless, real-time learning experience. This intuitive interface makes plant care guidance more accessible and user-friendly, especially for beginners.
2. **Personalized Insights**
   Leveraging GPT-powered responses, BOTANIQ delivers customized plant care recommendations, including watering schedules, sunlight requirements, and fertilizer needs. Additionally, it provides **Vastu insights** and **safety precautions**, ensuring users receive holistic plant-related guidance.
3. **Broad Audience Reach**
   The platform caters to a diverse audience, including plant enthusiasts, home decorators, and beginners in gardening. By addressing multiple aspects such as plant identification, care instructions, and Vastu benefits, BOTANIQ appeals to a wide range of users.

Weaknesses

1. **Dependency on External APIs**
   BOTANIQ relies on third-party APIs such as **Pl@ntNet** for plant identification and **OpenAI's GPT** for generating responses. Any disruptions or changes in these APIs may impact the platform's performance.
2. **Accuracy Limitations**
   The accuracy of plant identification and care recommendations depends on the quality of input images and dataset training. Misclassifications could lead to incorrect suggestions, affecting the user experience.
3. **Limited Offline Functionality**
   Since BOTANIQ operates using online APIs and cloud-based AI models, it requires a stable internet connection. Users in remote areas with limited connectivity may face accessibility issues.

Opportunities

1. **Multi-Language Support**
   Expanding language support can significantly enhance global reach and user adoption, making the platform more inclusive for non-English speakers.
2. **Partnerships & Collaborations**
   Collaborating with **nurseries, plant care brands, and home décor businesses** can provide opportunities for sponsorships, product recommendations, and increased credibility.
3. **Monetization Strategies**
   Introducing premium features such as **plant disease detection, personalized care reminders, and an online marketplace** can create revenue streams while enhancing user experience.

Threats

1. **Data Privacy Concerns**
   If BOTANIQ collects and stores user-uploaded images, there is a risk of unauthorized access or data breaches. Implementing strong security measures and transparent policies will be critical to maintaining user trust.
2. **Misinformation Risks**
   Incorrect or misleading plant care or Vastu recommendations could negatively impact users and lead to credibility issues. Ensuring accurate and well-researched data is essential.
3. **API Downtime & Reliability Issues**
   Since BOTANIQ relies on third-party APIs, any service downtime or API modifications could disrupt key functionalities, affecting user experience and platform reliability.

4. References

Reference Title	Source/Publisher	Link
Pl@ntNet API Documentation	Pl@ntNet Official	my.plantnet.org
OpenAI API Documentation	OpenAI	https://platform.openai.com/docs/api-reference/introduction
FastAPI Documentation	FastAPI Official	https://fastapi.tiangolo.com