

Research Article

Plant Assistant Application

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Abstract: The Plant Assistant Application is an innovative and comprehensive gardening tool designed to cater to the needs of gardening enthusiasts, novice gardeners, homeowners with gardens and urban dwellers with limited space. This application is envisioned to revolutionize the way people engage with plants and the art of gardening. The primary objectives of this application are to provide a plant identification feature, implement a speech recognition system, integrate text-to-speech functionality and deploy an openAi's GPT (Generative Pre-trained Transformer) to assist users. GPT models from OpenAI have undergone training to comprehend both natural language and code. These GPTs generate textual responses based on the input they receive. The results also suggest that Vertex AI is comprehensive machine learning platform, simplifying the end-to-end ML lifecycle. It offers tools for data preparation, model training, deployment, and monitoring, making it easier for businesses to develop and manage AI solutions at scale. In addition to these core features, the application also offers seasonal plant care guidance, a categorized plant database and a wealth of comprehensive plant information. The Plant Assistant's potential market includes gardening enthusiasts, beginners, homeowners with gardens and urban dwellers. This mobile application's innovative and creative features, such as its AI-driven plant identification tool, make it a powerful tool for plant lovers and aspiring gardeners. Its potential impact is far-reaching, as it empowers users to nurture and grow their green world with confidence and ease. The Plant Assistant Application can be easily downloaded for free from the Google Play Store. This app is dedicated to nurturing the interest of novice gardeners and strives to foster a love for gardening, all while providing essential support in plant care, ultimately ensuring a smooth and satisfying gardening journey.

Keywords: voice over speech synthesis; text synthesis; openAi GPT; gardening application; TensorFlow; SerpApi; Vertex AI.



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1. INTRODUCTION

The adoption of artificial intelligence (AI) has garnered significant attention across various industries, spanning from healthcare to automobile manufacturing (Verganti et al., 2020). AI technology, with its capacity to analyze data, make predictions, and automate tasks, has proven to be a powerful tool in enhancing productivity and problem-solving capabilities. Recognizing the potential of AI in improving the efficiency of various processes, we have embraced this technology in our project. We aim to leverage AI-related functionalities, including image capture recognition, speech recognition, text-to-speech (TTS) capabilities, and a responsive chatbot, to create a more intelligent and user-centric application. Additionally, the use of AI-powered tools and software has demonstrated substantial benefits across multiple domains, such as increasing productivity, improving customer service,

enabling flexible work arrangements, enhancing process governance, and conserving human resources (Lee & Tajudeen, 2020). Figure 1 and Figure 2 illustrate the timelines for online services to attain one million users and 100 million users, with Chat GPT emerging as the catalyst for the fastest adoption.

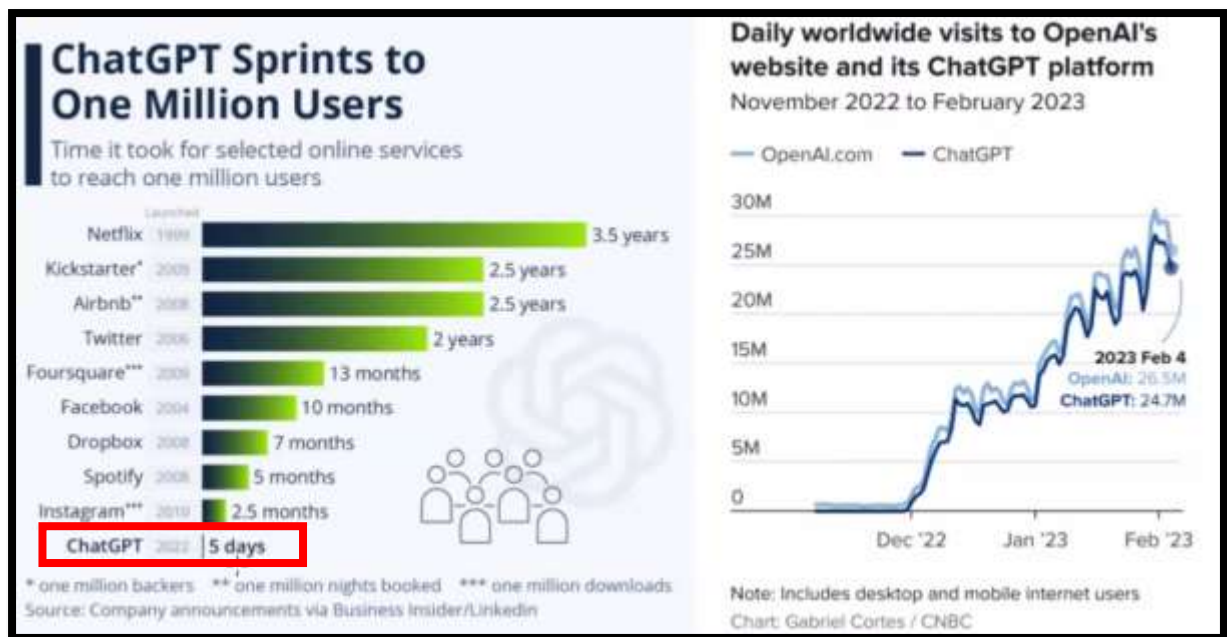


Figure 1. Chat GPT reach 1 million users in 5 days only compare to others online service.



Figure 2. Chat GPT reach 100 million users in 2 months only compare to others online service.

Figure 3 illustrates the significant technological revolution within the smartphone industry, providing estimates for the global number of smartphone users and the market size of mobile applications (Sandesara et al., 2022). This data underscores the profound impact of mobile devices and their increasing ubiquity on the design and functionality of mobile applications. In response to this

transformation, mobile applications are shifting towards a more user-centric approach, striving to enhance user engagement and usability. As a result, the adoption of mobile applications is on the rise, and users are seeking increasingly sophisticated and responsive tools to meet their needs.

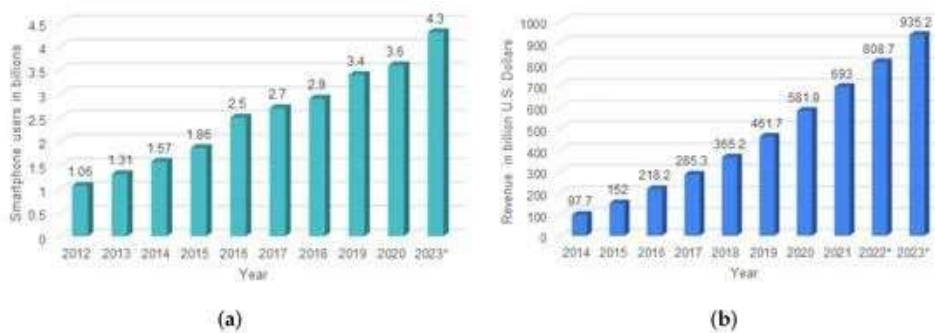


Figure 3(a): available count of smartphone users worldwide; **Figure 3(b)** shows global mobile application market size.

Unfortunately, the decline of botanical education and the disconnect between people and the natural world have become concerning trends, as highlighted by Stroud et al. (2022). The ongoing detachment from the world of plants could have far-reaching ecological and environmental consequences. This application is designed to serve as a comprehensive and user-friendly guide, providing users with essential information and expert guidance on plant care. By leveraging AI technology, it aims to bridge the gap between people and the plant kingdom, ultimately empowering users to cultivate and nurture healthy and thriving plants.

2. METHODOLOGY/DESIGN SOLUTION

The Agile methodology is a project management approach that involves breaking the project into phases and emphasizes continuous collaboration and improvement. Teams follow a cycle of planning, executing, and evaluating. Agile places a focus on adaptability and teamwork, allowing requirements to change as the project progresses (Atlassian, 2023).

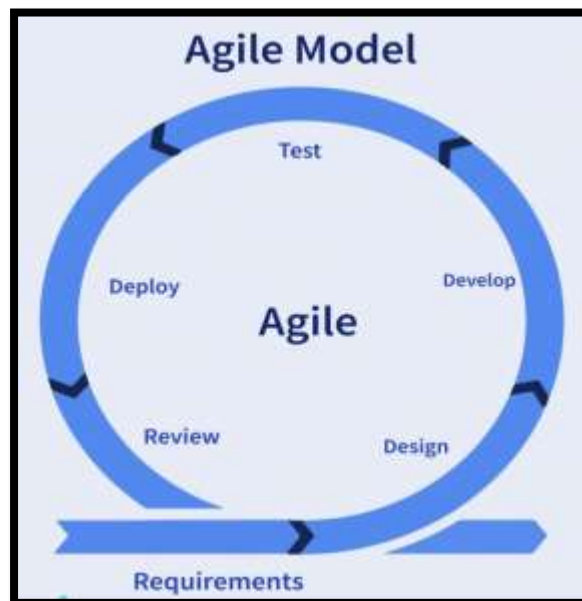


Figure 4. Agile Model (InterviewBit, 2022)

2.1 Requirement Gathering

The major goal of this phase is to acquire as much information, which the team will subsequently analyze. Comparing three various applications is the first step in this process. Evaluation form was used to conduct an interview with client, a specialist in plants and mobile applications. Gantt chart also has been created when organizing the application's development.

2.2 Design

Interface design of the Plant Assistant Application v2.0 App was developed to make it user-friendly, easier to navigate and not feed user too much information at once.

2.3 Develop

Once the design phase is complete, this phase will focus on continuous improvement and adaptability. The finalized design will be followed by all the implements including concept, release and maintenance.

2.4 Testing

After that, the tests will be held to identify any defects or errors in the application. If an error is found, it will be corrected so that no error will occur.

2.5 Deployment

After testing is complete, a crucial component of Agile software development is the deployment phase. In the final stage of the software development lifecycle, the finished product is made available to consumers or clients.

2.6 Review

The team evaluates the work done. It involves reviewing completed user stories or assignments, evaluating their quality and ensuring they meet the acceptance criteria and requirements. This phase conducts a meeting with client together to provide feedback.

3. FINDINGS

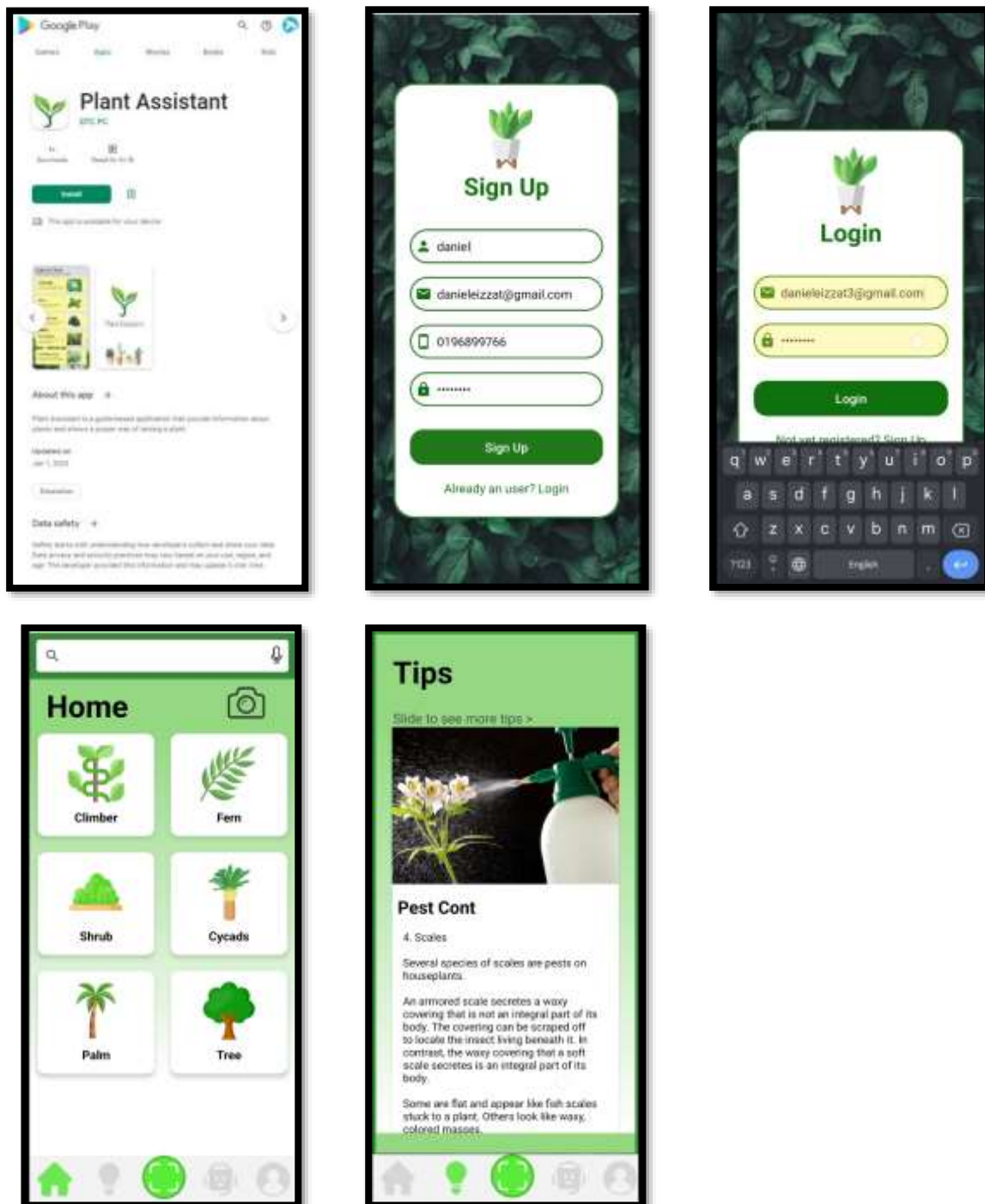


Figure 5. Application available in Google Play Store and main interface application



Figure 6. Interface Types of Plant

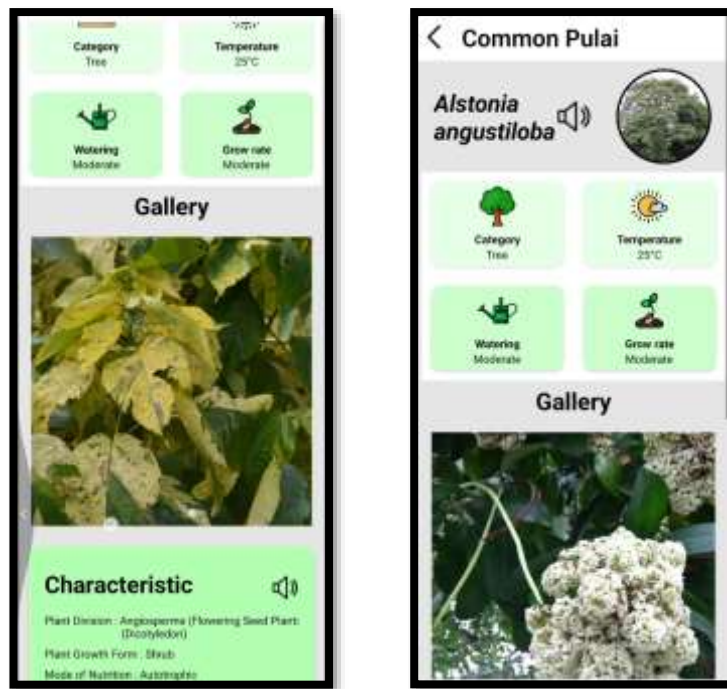


Figure 7. Interface example for types of plant

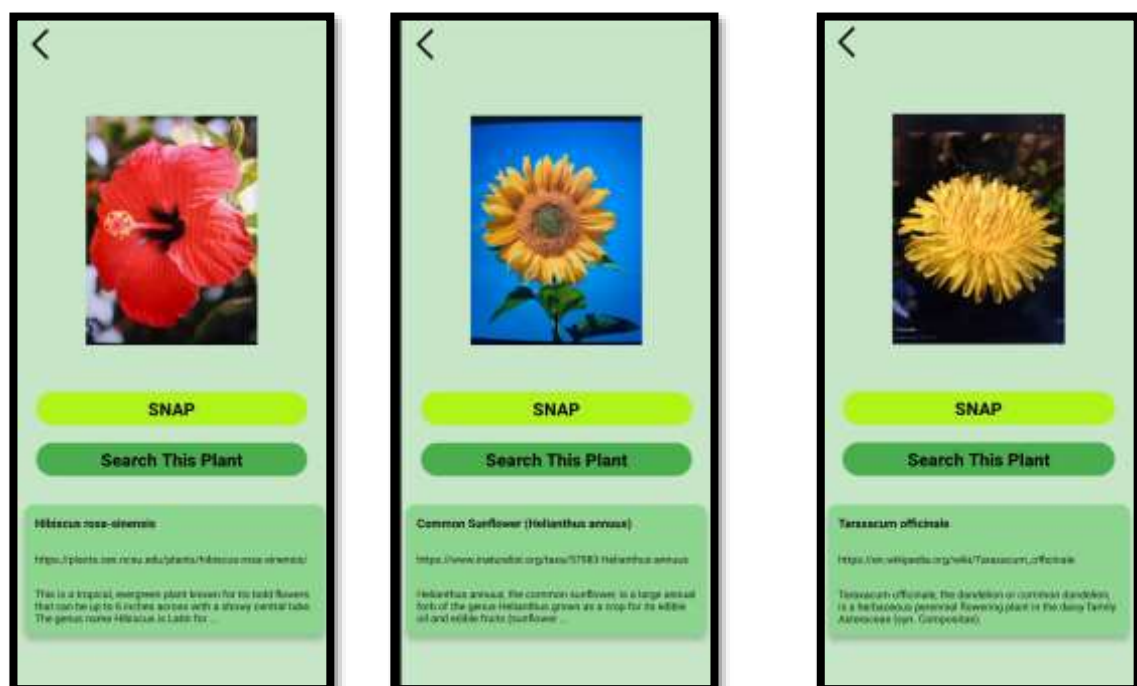


Figure 8. Vertex AI integration

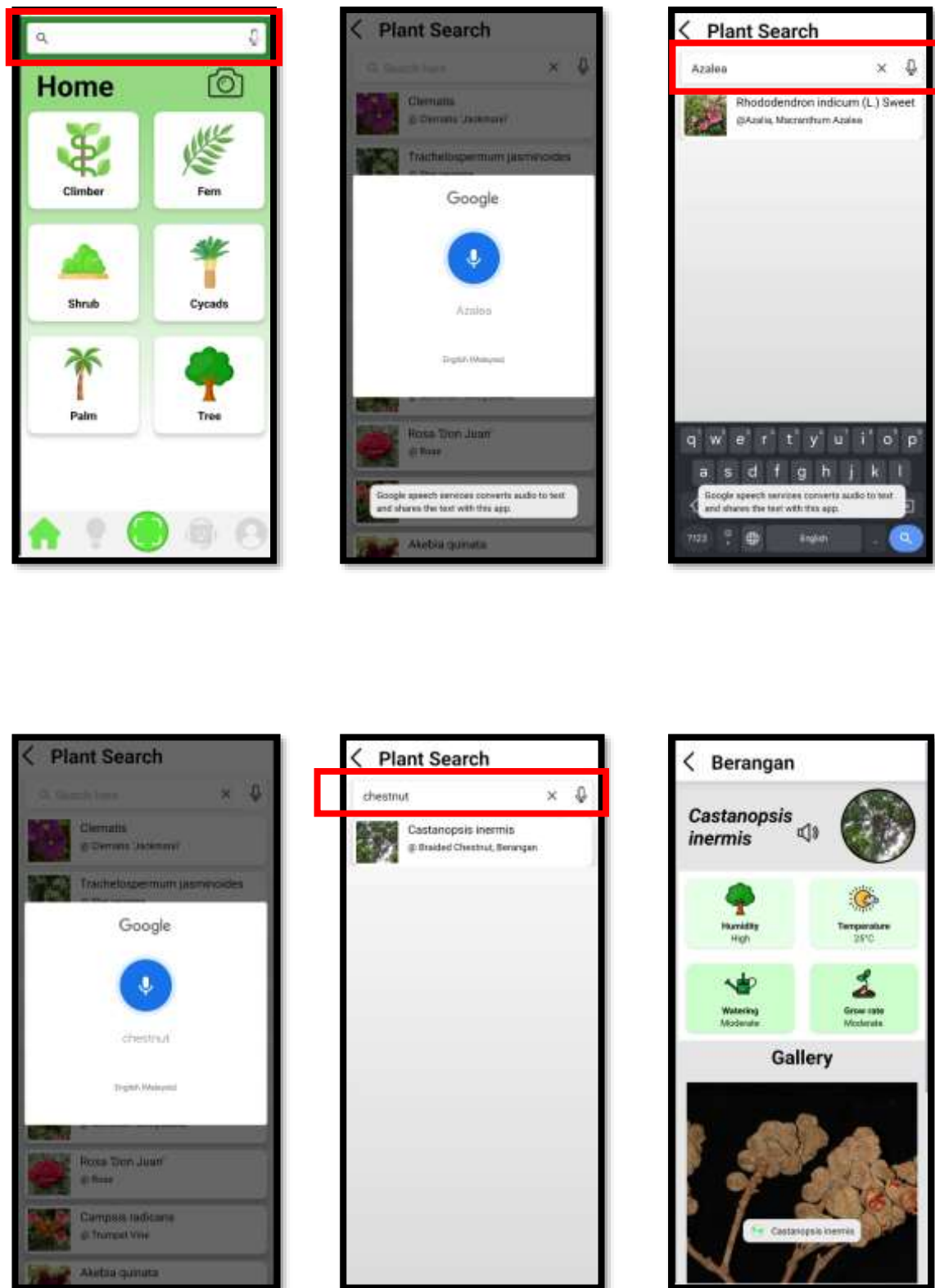


Figure 9. Voice recognition enhancement

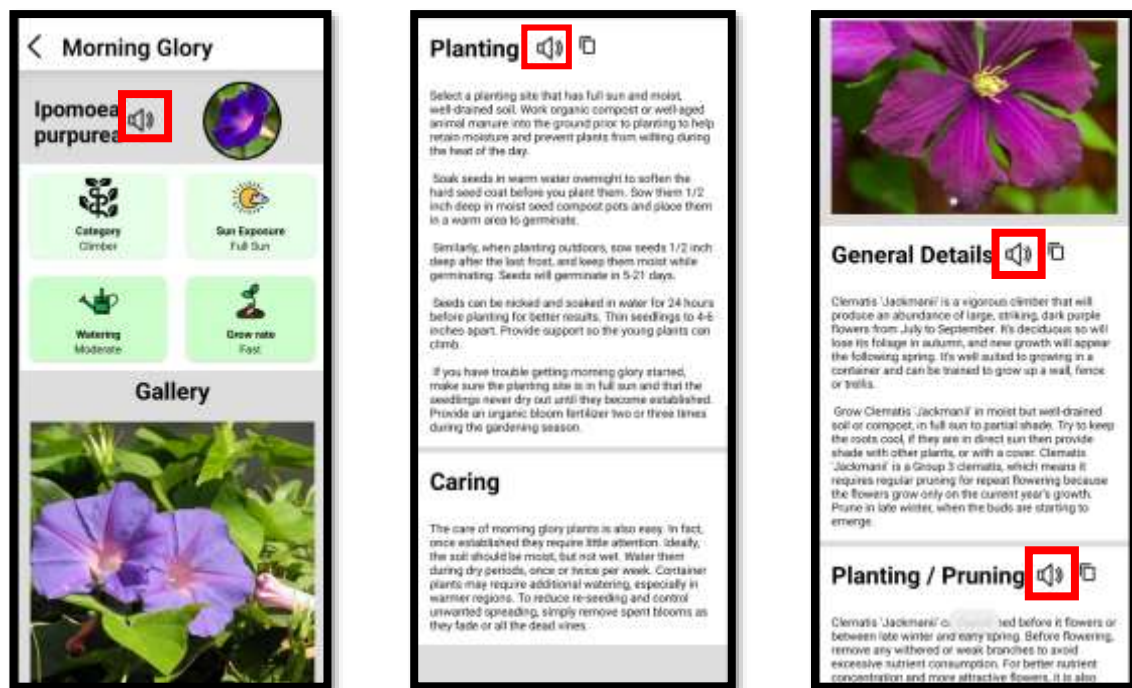
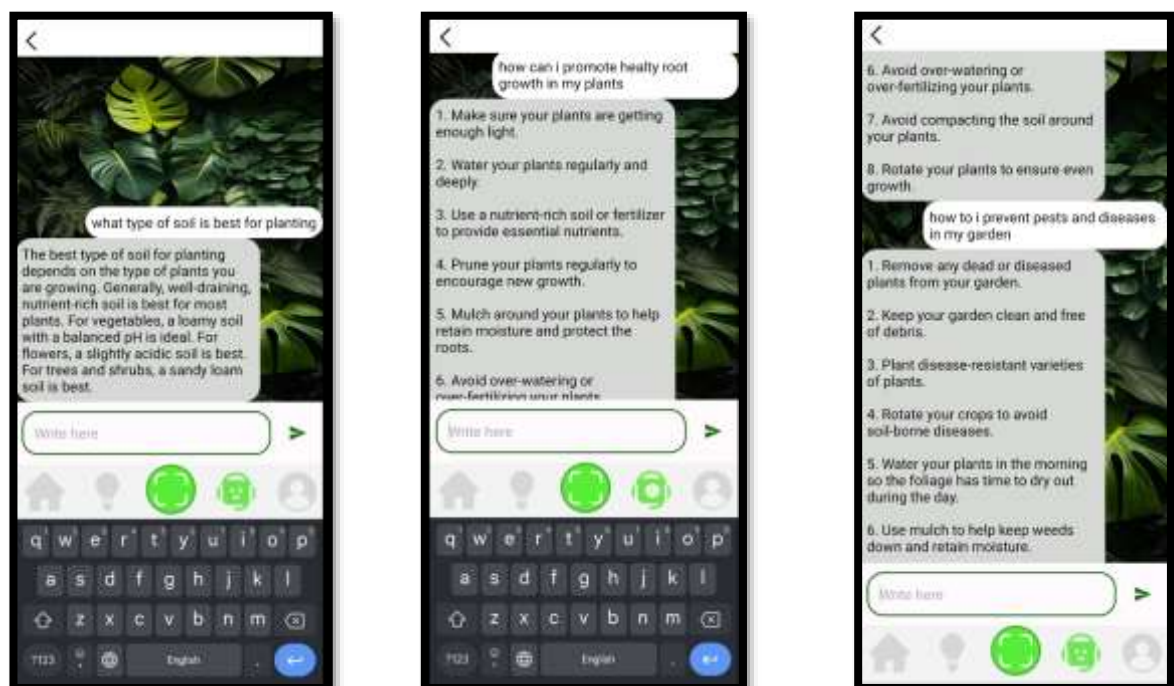


Figure 10. Inclusivity with Text-to-Speech



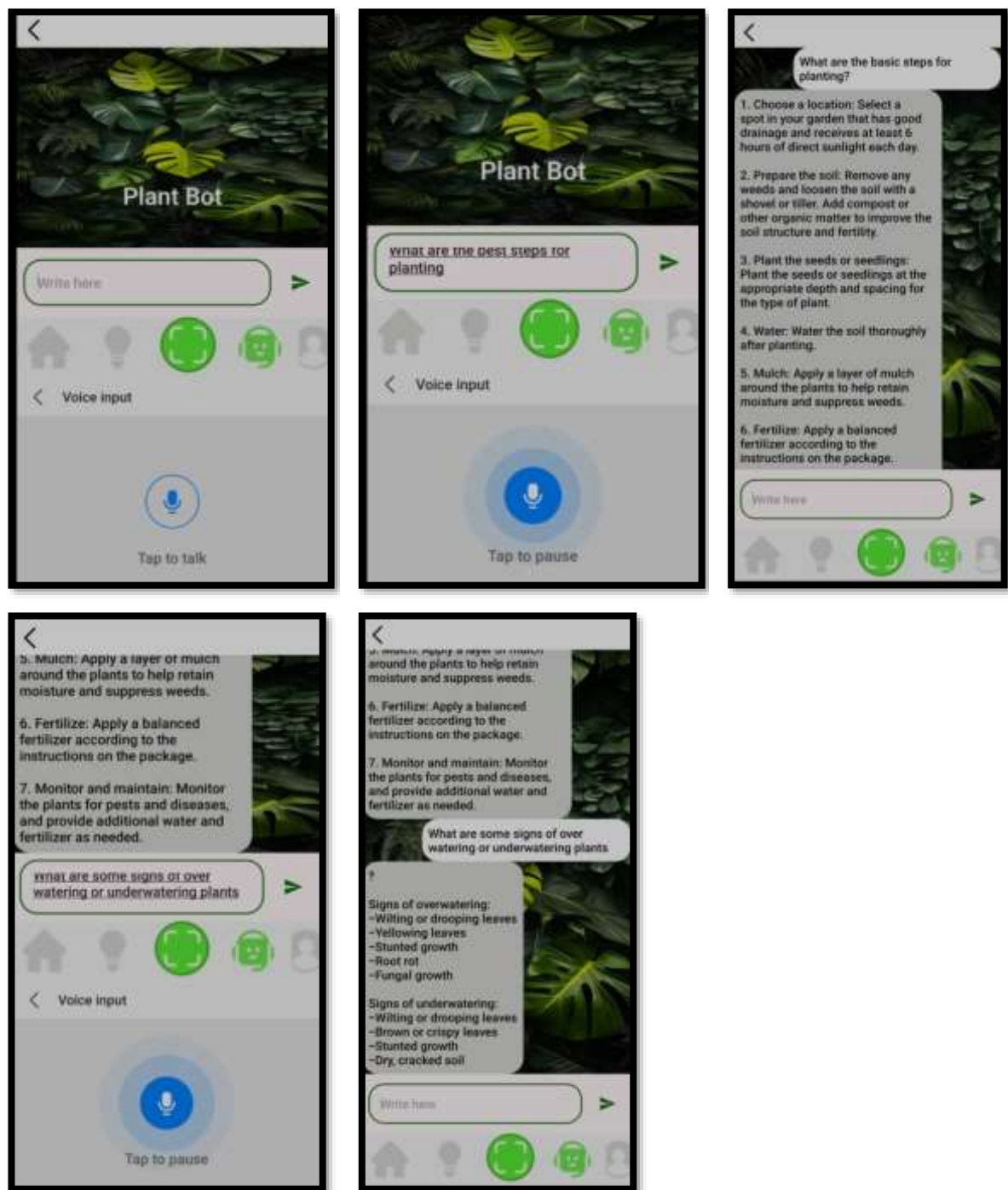


Figure 11. Conversational AI with OpenAI's GPT

4. INNOVATION HIGHLIGHT

The Plant Assistant Application is poised to revolutionize the world of plant care and horticulture by integrating cutting-edge technology in alignment with its core objectives. The pursuit of these objectives not only enhances the user experience but also opens up new horizons for plant enthusiasts and novices alike. Here, we delve into the innovation highlights stemming from these objectives:

4.1 Vertex AI Integration

The integration of Vertex AI represents a profound innovation, streamlining the application's capabilities and transforming plant care. This integration signifies a shift towards a more data-driven approach to plant identification. Vertex AI's machine learning tools enable the application to process data, train models, deploy them efficiently, and monitor their performance. The innovation lies in the application's ability to evolve its plant identification accuracy over time, learning from each interaction and continuously improving its identification capabilities. This innovation is in tune with the prevailing trend of AI-powered solutions that not only solve problems but also enhance our understanding of the natural world.

4.2 Voice Recognition Enhancement

The development of a voice recognition system within the application represents a significant leap in user interaction innovation. By enabling users to search for plant information using voice commands, the application creates a more intuitive and convenient experience. It's not merely a technological advancement but a transformation in how users engage with plant care. This innovation broadens the application's reach, catering to users who prefer voice-driven interactions. It signifies a departure from traditional text-based interactions and provides a glimpse into the future of human-computer communication, with voice recognition becoming an integral part of everyday life.

4.3 Inclusivity with Text-to-Speech

Inclusivity is at the core of the application's innovation with text-to-speech functionality. This feature breaks down accessibility barriers for visually impaired users, offering them an immersive and informative experience. The innovation lies in the application's commitment to making plant care knowledge accessible to a diverse user base. It showcases technology's potential to bridge gaps, promote environmental awareness, and ensure that no one is left behind. This innovation is a testament to the application's commitment to not only provide information but also to connect individuals with the natural world.

4.4 Conversational AI with OpenAI's GPT

The integration of OpenAI's GPT as a responsive chatbot is a groundbreaking innovation in user engagement. It transforms the application into a conversational platform, enhancing the quality of user interactions. This chatbot not only provides quick and accurate responses but also creates a more personalized user experience. The innovation here is in the application's ability to provide users with a conversational partner that understands their needs and responds in a natural and engaging manner. This chatbot represents a significant leap in the development of AI-driven customer service and sets a new standard for user engagement in plant care applications.

5. COMMERCIAL VALUES/APPLICATION

5.1 Plant enthusiasts

Experienced gardeners and individuals passionate about plants will regard Plant Assistant Application as an invaluable tool for broadening their plant collections, enriching their knowledge, and enhancing their gardening proficiency. It empowers them to elevate their enthusiasm for plants and make well-informed choices regarding plant care.

5.2 Novice gardeners

Those new to gardening can depend on Plant Assistant Application as a comprehensive resource for acquiring knowledge about various plants, comprehending their care requisites, and receiving guidance on the art of nurturing and preserving a thriving garden. The application simplifies the learning process and provides novice gardeners with the confidence to commence their gardening journey.

5.3 Garden owning Residents

Homeowners with gardens experience the convenience afforded by Plant Assistant Application, granting them effortless access to plant data, care instructions, and personalized reminders. This empowerment assists them in the upkeep of their gardens, irrespective of their experience level, ensuring their gardens remain splendid and robust.

5.4 Urban Inhabitants with Limited Space

Even within compact urban environments, Plant Assistant Application delivers invaluable guidance. Urban residents can explore suitable plants for their confined gardens or indoor spaces, access care instructions tailored to space constraints, and expand their knowledge of plants. The application empowers them to introduce greenery into urban settings, fostering a connection with the natural world.

6. DISCUSSION

The objectives set for the development of the Plant Assistant Application represent a forward-looking approach to enhancing the user experience and expanding the application's capabilities. Each of these objectives is designed to harness the power of advanced technologies, making plant care and information more accessible and engaging for users.

6.1 Implementation of Vertex AI

The adoption of Vertex AI, a comprehensive machine learning platform, is a significant stride in modernizing the Plant Assistant Application. By utilizing Vertex AI, the application can streamline the entire machine learning process, from data preparation to model training, deployment, and monitoring. This integration empowers the application to accurately identify plant names and provide detailed information, enriching the user experience and aligning with the prevailing trend of AI-powered solutions in problem-solving and knowledge enhancement.

6.2 Voice Recognition System

The development of a voice recognition system within the application ushers in a new era of user interaction. Users can now effortlessly search for plant information through voice commands, enhancing convenience and accessibility. This feature not only caters to a broader user base, including those who prefer voice-driven interactions, but also transforms the user experience into a more intuitive and engaging process. Voice recognition adds a layer of interactivity that complements the application's goal of connecting people with plants.

6.3 Text-to-Speech Functionality

The inclusion of text-to-speech functionality exemplifies the application's commitment to inclusivity. This feature ensures that visually impaired users can access plant information effortlessly.

It not only provides care details but also empowers individuals with disabilities to connect with the natural world. In doing so, the application extends its reach and utility to a diverse and often underserved user group. By offering an inclusive experience, it underscores the role of technology in breaking down barriers and fostering a sense of environmental responsibility.

6.4 OpenAI's GPT Integration

The deployment of OpenAI's GPT as a responsive chatbot within the application represents a significant leap in enhancing user engagement. This chatbot is capable of providing quick and accurate responses to user inquiries and assistance requests. By leveraging the language capabilities of GPT, the application offers a more conversational and personalized user experience. This integration not only streamlines user interactions but also sets a new benchmark for customer service in the context of plant care applications. It transforms the application into a more interactive and user-friendly platform, ensuring that users can find the information they need with ease.

7. CONCLUSION

In conclusion, the objectives set forth for the Plant Assistant Application project represent a visionary approach to improving the user experience and bringing advanced technology to the world of plant care and information. The implementation of Vertex AI streamlines the machine learning process, ensuring that plant identification is accurate and detailed. The addition of voice recognition and text-to-speech functionality enhances accessibility and inclusivity, making the application a valuable resource for a broader user base. The integration of OpenAI's GPT as a responsive chatbot transforms the application into a more engaging and interactive platform. Together, these objectives ensure that the Plant Assistant Application is poised to become a cutting-edge and user-centric tool for plant enthusiasts, gardeners, and individuals seeking to connect with the natural world in a meaningful way. It is a testament to the potential of technology to enrich our lives and deepen our understanding of the environment.

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