



# MINI-PROJECT PRESENTATION

## GreenBot: A ChatBot for Home Gardeners

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# INTRODUCTION



- Home gardening has seen a surge in popularity, attracting millions of new enthusiasts. But for beginners, the vast amount of information can & navigating the world of plant care can be overwhelming.
- Finding reliable and specific information on a vast array of plant varieties can be a time-consuming challenge. GreenBot, a chatbot designed to assist home gardeners, tackles this issue by providing real-time access to essential plant care knowledge.
- Leveraging advanced technologies like artificial neural networks (ANNs) and natural language processing (NLP), GreenBot can answer questions about planting basics like sowing depth, spacing, ideal temperature, and harvesting time required.
- This empowers new gardeners with the information they need to get started and nurture their plants successfully.

# PROBLEM STATEMENT



The rise in popularity of home gardening has created a surge of new Home Gardening enthusiasts, but many of them struggle to find reliable and specific information depending on their needs. This lack of readily available, interactive guidance hinders their ability to successfully navigate the world of plant care.

# CURRENT CHALLENGES



- Information Overload: The vast amount of online resources and books can be overwhelming, making it difficult to identify reliable sources and pinpoint specific advice.
- Generic Advice: Existing resources often provide broad, generic recommendations that may not be applicable to individual plant varieties, local climates, or unique gardening goals.
- Misinformation and Inconsistencies: Navigating through a sea of information can lead to confusion and conflicting advice. This inconsistency can cause frustration and hinder effective gardening practices, as beginners struggle to determine the best course of action.
- Lack of Interactivity: Traditional resources lack the interactivity needed for users to receive real-time answers to their specific questions. This limits their ability to address immediate gardening concerns effectively.

# LITERATURE SURVEY



Otter, D. W., Medina, J. R., & Kalita, J. K. (2021) : This survey reviews deep learning applications in NLP, covering areas like text classification and conversational agents. These advancements can enhance GreenBot's ability to understand and respond accurately to plant care queries.

Deeplearning.ai : This resource covers NLP principles and practices with a focus on deep learning. It provides practical examples and strategies that can guide GreenBot's implementation of deep learning models, improving its processing of user inputs and gardening advice.

Adamopoulou, E., & Moussiades, L. (2020) : This chapter provides an overview of chatbot technologies, discussing design principles and evaluation metrics. This knowledge helps design a robust system for GreenBot and iteratively enhance its plant care responses.

Farm Sector Policy Department (2018) : This paper discusses the plantation and horticulture sectors, including crop management and technological interventions. This information will enhance GreenBot's advice, ensuring practical and impactful gardening guidance.

Bhagwat, V. A. : This work explores deep learning techniques for chatbots, highlighting models that enhance conversational agents. Applying these insights to GreenBot can improve its ability to provide accurate, relevant plant care advice.

## ❖ Software:

- Operating System: Windows 10 (or later), macOS Mojave (or later)
- Integrated Development Environment (IDE): Visual Studio Code (or equivalent)
- Programming Language: Python
- Web framework: Flask
- Web framework extension: Flask-Cors (Cross-Origin Resource Sharing support for Flask applications)
- Libraries Required
  - ***scikit-learn*** (Machine learning library for classical machine learning algorithms and tools)
  - ***pickle*** (Library for serialization and deserialization of Python objects, especially for model persistence)
  - ***pandas*** (Data manipulation and analysis library for numerical tables and time series)
  - ***numpy*** (Fundamental package for scientific computing with support for large, multi-dimensional arrays)
  - ***nlTK*** (Natural Language Toolkit for natural language processing tasks)
  - ***Keras*** (High-level neural networks API for deep learning experimentation)
  - ***TensorFlow*** (Open-source deep learning framework for building and training neural networks)



## ❖ Hardware:

- Personal Computer or Laptop
- Minimum 4GB RAM
- Processor: Intel i3 or equivalent
- Sufficient Storage for software and datasets



# MOTIVATION OF THE PROJECT



Home gardening, especially for culinary plants, is a rewarding but often challenging hobby. Many home gardeners struggle to find coherent and reliable resources for plant care, soil management, and pest control. GreenBot aims to address this gap by leveraging advanced technologies to provide personalized and expert gardening assistance.

The motivation behind GreenBot is to enhance the gardening experience for home gardeners by making expert knowledge readily available and easy to understand. By using artificial neural networks (ANNs) and natural language processing (NLP), GreenBot can analyze user queries and offer tailored recommendations based on specific needs and conditions. This personalized approach ensures that users receive relevant and practical advice, improving their gardening success.

Additionally, the use of Python, with its powerful libraries for NLP and ANN development, allows for the creation of a robust and efficient chatbot. By gathering and preprocessing extensive gardening data, GreenBot will be trained to deliver accurate and insightful responses to a wide range of gardening questions.

# OBJECTIVE & SCOPE OF THE PROJECT



## ❖ Objective:

1. **Provide Personalized Plant Care Guidance:** To offer users accurate and reliable gardening advice tailored to specific plant needs, including sowing instructions, spacing requirements, harvest times, and other relevant information based on user queries.
2. **Interactive System:** Enable interactive communication with real-time responses to user queries, enhancing user engagement and satisfaction.
3. **Scalable Architecture:** Design the system architecture to be scalable and robust, capable of handling many user interactions without performance degradation.
4. **Future Expansion:** Plan for the addition of more data to further enhance the gardening assistance provided.

# OBJECTIVE & SCOPE OF THE PROJECT



## Scope:

1. **Target Audience:** GreenBot is designed primarily for new and beginner home gardeners, and anyone seeking accessible and reliable plant-specific advice.
2. **Web Application:** The project includes the development of a web-based application accessible through web browsers, to provide a user-friendly platform for interaction.
3. **NLP and AI Integration:** Utilize Natural Language Processing (NLP) and Artificial Intelligence (AI) techniques to process user queries and generate relevant responses.
4. **Data Sources:** Rely on curated datasets from reliable gardening websites, articles, and forums to build a comprehensive knowledge base for the GreenBot.

# METHODOLOGY



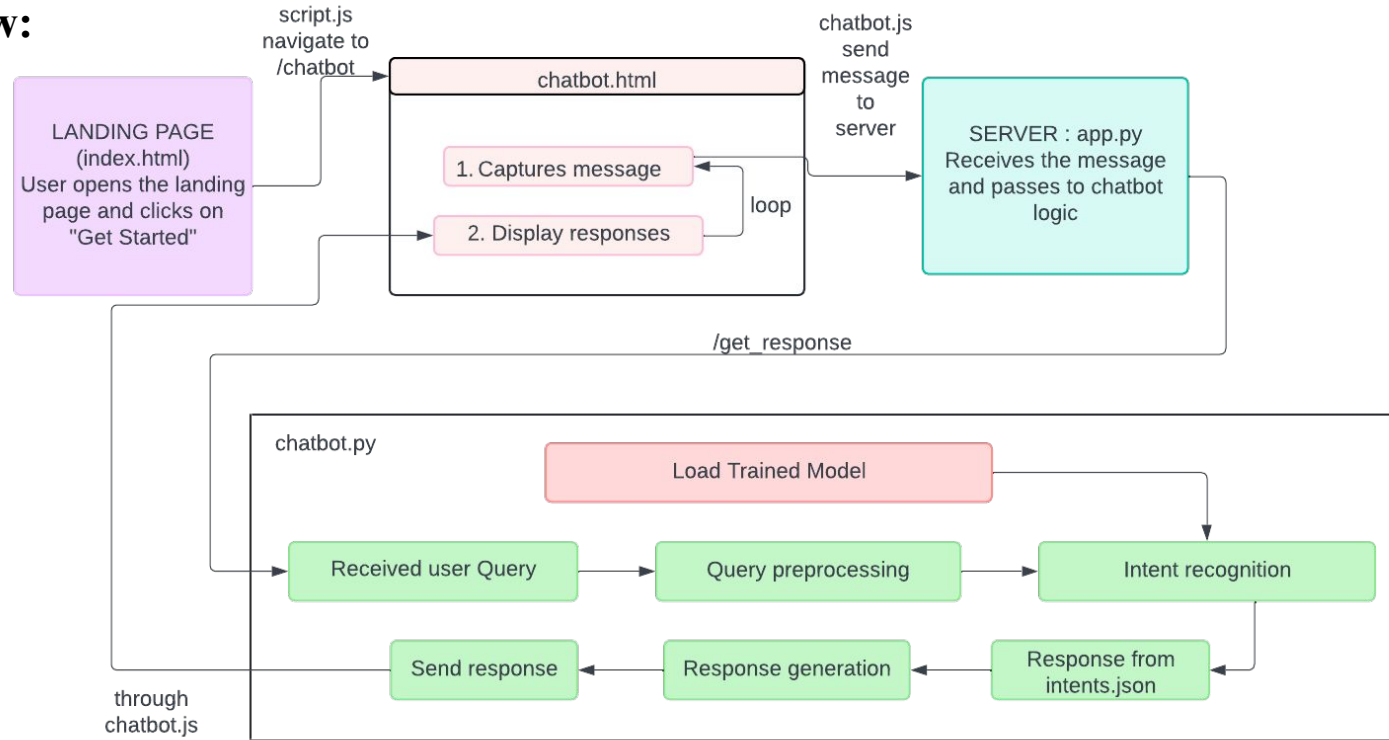
GreenBot adopts a user-centric design with the following key components:

- **User Interface:** A user-friendly interface allows users to interact with GreenBot through text-based inputs. This interface can be a mobile app, a web application, or a chat interface. Users can ask questions, receive plant recommendations, and access plant care guides tailored to their specific needs.
- **Natural Language Processing (NLP) Module:** This module acts as a bridge between users and GreenBot. It processes and interprets user queries, converting natural language into a format that the system can understand.
- **Artificial Neural Networks (ANNs):** GreenBot utilizes ANNs for pattern recognition and predictive analysis. By analyzing user queries and the vast gardening knowledge base, ANNs can identify patterns and generate personalized recommendations on plant care, suitable for the user's specific context.
- **Dataset:** GreenBot leverages a comprehensive dataset containing information on various home gardening topics. This data includes details on plant varieties, plantation instructions, plant care requirements, culinary applications (for edible plants), and preservation methods.

# SYSTEM ARCHITECTURE & PROPOSED SYSTEM



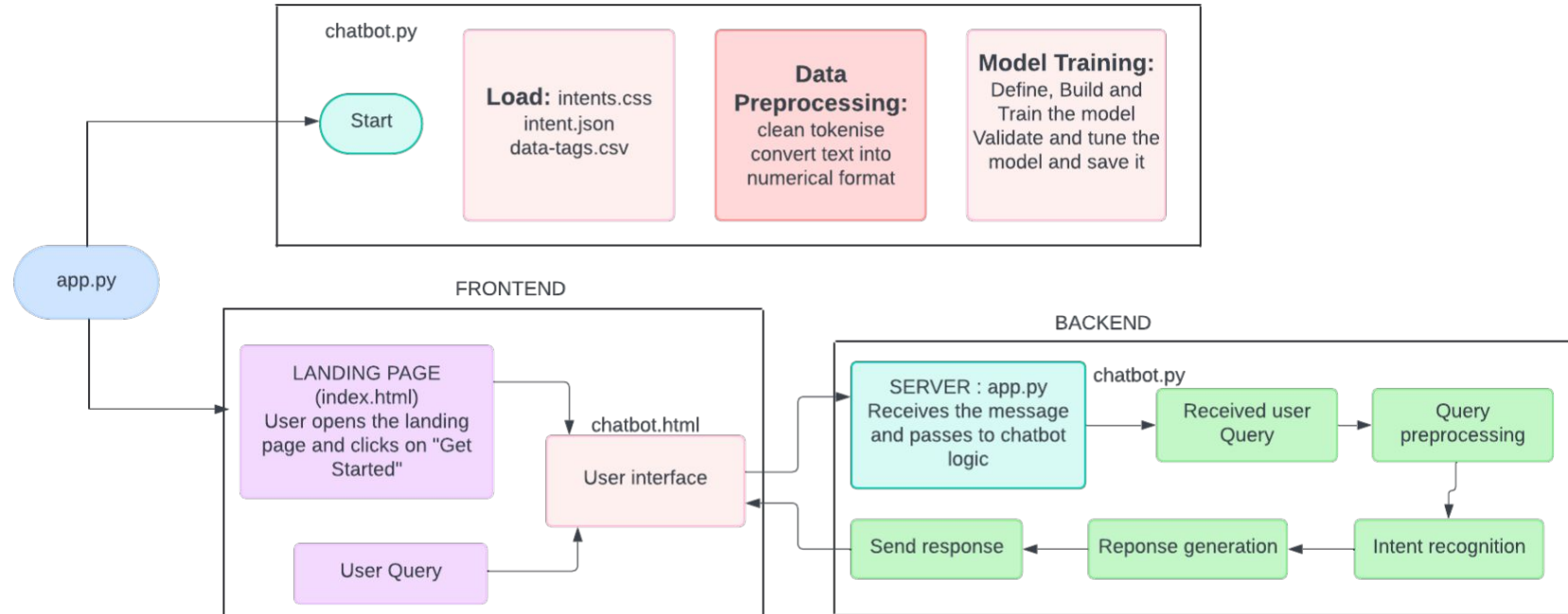
## Flow OverView:



# SYSTEM ARCHITECTURE & PROPOSED SYSTEM



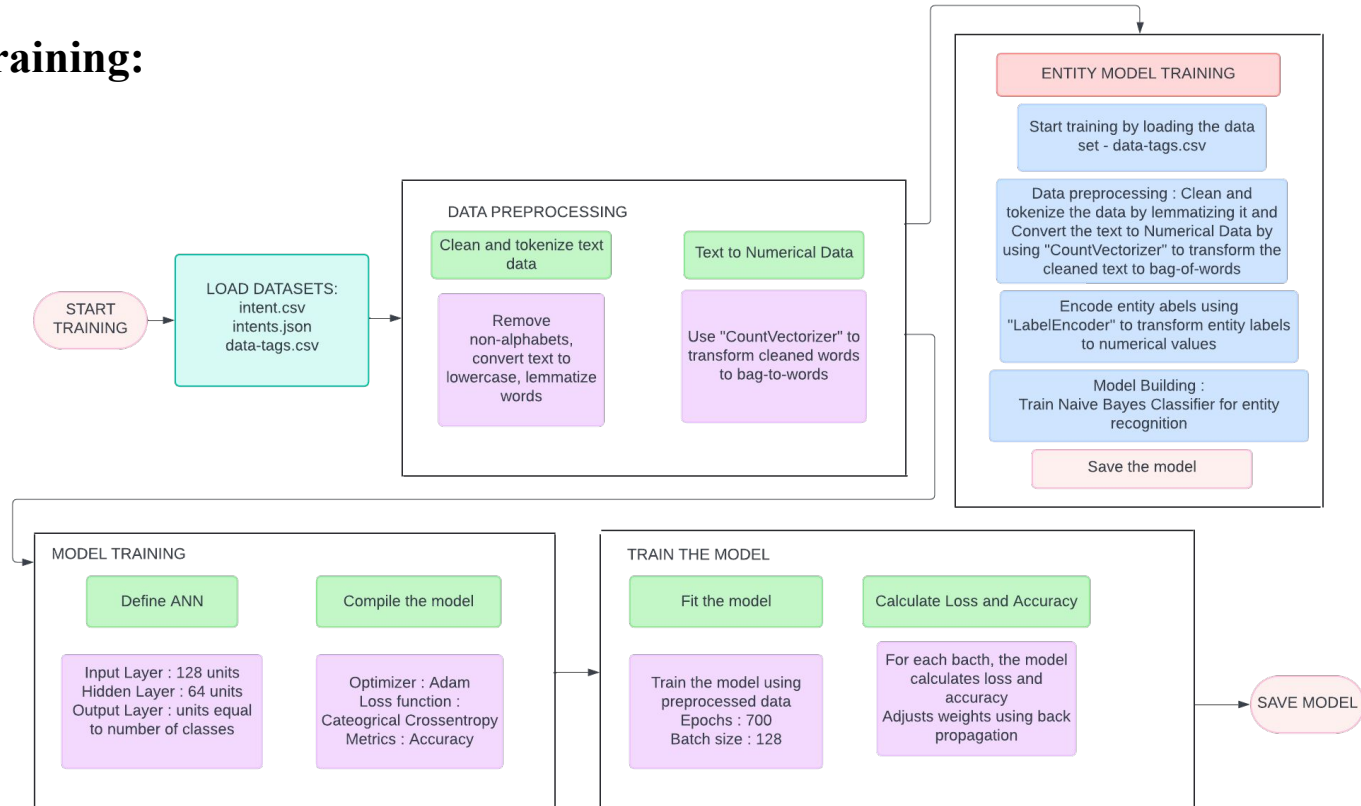
## Server Flow:



# SYSTEM ARCHITECTURE & PROPOSED SYSTEM



## ChatBot Training:



# Technology Used



- **Artificial Neural Networks (ANN):** Employed for their ability to mimic the human brain's structure and functionality, enabling sophisticated pattern recognition and predictive capabilities.
- **Natural Language Processing (NLP):** Facilitates communication between users and GreenBot by understanding and interpreting human language, allowing for seamless interactions.

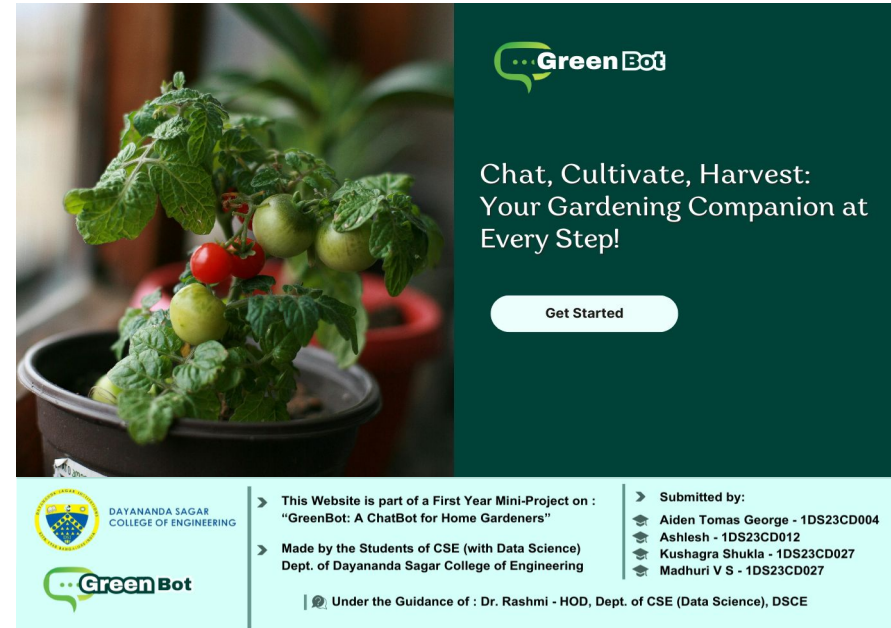


# RESULT & DISCUSSION



This project outlines the development of a chatbot which can be accessed through web locally, specifically designed to assist culinary gardeners. The chatbot will provide users with readily accessible information on various culinary plants, empowering them to make informed decisions for their gardens.

Website Landing Page:



# RESULT & DISCUSSION



Hi  
Hello

How to Grow Amaranth ?

Sow in garden. Sow seed at a depth approximately three times the diameter of the seed. Best planted at soil temperatures between 64°F and 86°F. (Show °C/cm)

What temperature to grow Amaranth?

Best planted at soil temperatures between 64°F and 86°F. (Show °C/cm)

How to Grow Potato ?

Plant tuber. Best planted at soil temperatures between 50°F and 86°F. (Show °C/cm)

How to Sow Potato ?

Plant tuber. Best planted at soil temperatures between 50°F and 86°F. (Show °C/cm)

Where to grow tomato ?

Grow in seed trays, and plant out in 4-6 weeks.

Chat here



# RESULT & DISCUSSION

## **GreenBot's Capabilities:**

- **Knowledge Base:**

GreenBot's information comes from a comprehensive knowledge base built through expert curation and automated data gathering from trusted sources. It covers planting, care, and harvesting details for a wide range of culinary plants.

- **Growing Environment:**

GreenBot helps understand crop preferences, such as temperature requirements and optimal planting locations (garden bed vs. container).

- **Harvesting:**

Provides information on optimal harvesting times for various crops.

- **User Interface:**

Features a user-friendly, text-based chat interface for conversational queries, with potential future mobile app integration.

- **Accessibility:**

Accessible on smartphones, tablets, and computers.

# RESULT & DISCUSSION

## Impacts of GreenBot:

- **Empowering Gardeners:** By providing information on plant care tailored to their specific questions, GreenBot empowers users to make informed decisions, leading to a thriving garden. New gardeners can avoid common mistakes, while experienced gardeners can explore new plant varieties with confidence.
- **Increased Engagement:** The interactive format allows users to have a conversation with GreenBot, making learning about gardening more engaging than passively reading online resources. Users can ask questions as they arise, fostering a more dynamic learning experience.
- **Reduced Reliance on External Resources:** Users will have readily available information at their fingertips, eliminating the need to search for online resources constantly. GreenBot provides a one-stop shop for basic gardening knowledge, saving users time and frustration.
- **Improved Sustainability:** By helping users cultivate their own food successfully, GreenBot can contribute to a more sustainable approach to food production by reducing reliance on commercially grown produce and its associated transportation footprint. This can lead to a more localized food system and potentially lower environmental impact.

# FUTURE SCOPE

- **Expanding the Knowledge Base:** Looking for opportunities to gather information from additional trusted sources to broaden the scope of plants GreenBot can answer questions about. User feedback can also be a valuable resource for identifying knowledge gaps.
- **Refining Information:** Over time, user interactions and feedback can help identify areas where the information in the knowledge base can be improved or expanded upon.
- **Advanced Natural Language Processing:** In future iterations, GreenBot may incorporate more sophisticated natural language processing techniques. This could involve features like:
  - **Clarification Prompts**
  - **Disambiguation Techniques**
- **Personalization:** Exploring ways to personalize user experiences is another area of future development. This could involve tailoring information based on factors like: **Location, Garden Size, Plant Preferences etc.**
- **Voice Recognition Integration:** The integration of voice recognition capabilities would make GreenBot even more accessible and user-friendly, particularly for those with visual impairments or who simply prefer a hands-free gardening assistant.

# CONCLUSION



- The development of GreenBot represents an advancement in home gardening support, utilizing Artificial Neural Networks (ANNs) and Natural Language Processing (NLP) to deliver personalized, real-time guidance for plant care. By addressing common challenges such as information overload, generic advice, and the lack of interactive resources, GreenBot provides gardeners with accurate, context-specific recommendations, significantly enhancing their gardening experience and yielding better outcomes.
- GreenBot's development is focused on providing tailored guidance for individual plant care needs. Its ability to interact in real-time and offer personalized advice sets it apart from traditional gardening resources, which often provide broad and static information. This interactive and user-centric approach not only makes gardening more accessible for beginners but also serves as a tool for experienced gardeners seeking specific information on new plant varieties and techniques.
- Moving forward, the future development of GreenBot will focus on expanding its knowledge base, refining its NLP capabilities, and enhancing user personalization. These enhancements will ensure that GreenBot continues to meet the diverse needs of home gardeners, promoting successful and sustainable gardening practices. Through this approach, GreenBot aims to make home gardening more accessible, efficient, and enjoyable for all enthusiasts.

# REFERENCES



<b>PAPERS:</b>	<b>INSIGHT:</b>
<p>Otter, D. W., Medina, J. R., &amp; Kalita, J. K. (2021). A survey of the usages of deep learning for natural language processing. IEEE Transactions on Neural Networks and Learning Systems, 32(2), 604–624 <a href="https://ieeexplore.ieee.org/document/9075398">https://ieeexplore.ieee.org/document/9075398</a></p>	<ul style="list-style-type: none"><li>❑ This survey reviews the applications of deep learning in NLP, covering text classification, machine translation, sentiment analysis, and conversational agents. The advancements in neural network architectures and techniques can enhance GreenBot’s ability to understand and respond accurately to user queries about plant care, leveraging these deep learning methods to improve chatbot performance.</li></ul>

# REFERENCES



PAPERS:	INSIGHT:
<p>Farm Sector Policy Department (2018), <b><i>Sectoral Paper on Plantation and Horticulture.</i></b> <a href="https://nabfoundation.in/pdf/Plantation-and-Horticulture.pdf">https://nabfoundation.in/pdf/Plantation-and-Horticulture.pdf</a></p>	<ul style="list-style-type: none"><li>❑ <b>Data to Train our GreenBot:</b> Provides comprehensive data and insights into various aspects of horticulture, including best practices, common issues, and innovative techniques. By leveraging this data, we can create detailed datasets. which will be used for developing GreenBot.</li></ul>
<p>Carlos Gershenson (2003), <b><i>Artificial Neural Networks for Beginners.</i></b> <a href="https://www.researchgate.net/publication/1956697_Artificial_Neural_Networks_for_Beginners">https://www.researchgate.net/publication/1956697_Artificial_Neural_Networks_for_Beginners</a></p>	<ul style="list-style-type: none"><li>❑ <b>ANN Basics:</b> The paper elucidates the basic concepts and principles of ANNs. By utilizing it, we can develop the neural network architecture necessary for processing user inputs, generating responses, and improving GreenBot's performance through machine learning algorithms</li></ul>



# REFERENCES



PAPERS:	INSIGHT:
<p>NLP, <a href="https://www.deeplearning.ai/resources/natural-language-processing/">https://www.deeplearning.ai/resources/natural-language-processing/</a></p>	<ul style="list-style-type: none"><li>❑ This resource offers comprehensive materials on NLP principles and practices, focusing on deep learning. It includes tutorials and case studies demonstrating NLP applications. These practical examples and strategies will guide the implementation of deep learning models in GreenBot, improving its processing of complex user inputs and optimizing its gardening advice.</li></ul>
<p>Bhagwat, V. A. (n.d.). <i>Deep Learning for Chatbots</i>. <a href="https://doi.org/10.31979/etd.9hrt-u93z">https://doi.org/10.31979/etd.9hrt-u93z</a></p>	<ul style="list-style-type: none"><li>❑ This work explores the use of deep learning techniques specifically for chatbots, discussing various models and their applications in creating more intelligent conversational agents. The insights gained from this study can be applied to GreenBot to leverage deep learning models, enhancing the chatbot's ability to provide accurate answers.</li></ul>

# THANK YOU