

PLANT DISEASE FERTILIZER RECOMMENDATION SYSTEM

A UG PROJECT PHASE-1 REPORT

Submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

In partial fulfilment of the requirements for the award of the degree of

**BACHELOR OF TECHNOLOGY
IN
COMPUTER SCIENCE AND ENGINEERING**

Submitted by

**VENUVANKA BHAVANI
GOLLAPELLY RUTHVIK
DARAM SANGEETHA
MACHARLA VAMSHI SAI**

**19UK1A0514
19UK1A0505
19UK1A0503
19UK1A0510**

Under the esteemed guidance of

Mrs. T.SRAVANTHI
(Assistant Professor)



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
VAAGDEVI ENGINEERING COLLEGE**

(Affiliated to JNTUH, Hyderabad)
Bollikunta, Warangal – 506005

2019– 2023

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
VAAGDEVI ENGINEERING COLLEGE
BOLLIKUNTA, WARANGAL – 506005
2019 – 2023



CERTIFICATE OF COMPLETION
UG PROJECT PHASE-1

This is to certify that the Industry Oriented Mini Project entitled “**PLANT DISEASE FERTILIZER RECOMMENDATION SYSTEM**” is being submitted by **V.BHAVANI(H.NO:19UK1A0514),G.RUTHVIK(H.NO:19UK1A0505),D.SANGEETHA(H.NO:19UK1A0503),M.VAMSHI SAI(H.NO:19UK1A0510)** in partial fulfilment of the requirements for the award of the degree of **Bachelor of Technology in Computer Science and Engineering** to **Jawaharlal Nehru Technological University Hyderabad** during the academic year **2022-23**, is a record of work carried out by them under the guidance and supervision.

Project Guide
Mrs. T.SRAVANTHI
(Assistant Professor)

Head of the Department
Dr. R. Naveen Kumar
(Professor)

External

ACKNOWLEDGEMENT

We wish to take this opportunity to express our sincere gratitude and deep sense of respect to our beloved **Dr. P. PRASAD RAO**, Principal, Vaagdevi Engineering College for making us available all the required assistance and for his support and inspiration to carry out this UG Project Phase-I in the institute.

We extend our heartfelt thanks to **Dr. R. NAVEEN KUMAR**, Head of the Department of CSE, Vaagdevi Engineering College for providing us necessary infrastructure and thereby giving us freedom to carry out the UG Project Phase-I.

We express heartfelt thanks to Smart Bridge Educational Services Private Limited, for their constant supervision as well as for providing necessary information regarding the UG Project Phase-I and for their support in completing the UG Project Phase-I.

We express heartfelt thanks to the guide, **Mrs. T.SRAVANTHI**, Assistant professor, Department of CSE for her constant support and giving necessary guidance for completion of this UG Project Phase-I.

Finally, we express our sincere thanks and gratitude to my family members, friends for their encouragement and outpouring their knowledge and experience throughout the thesis.

V. BHAVANI
G.RUTHVIK
D.SANGEETHA
M.VAMSHI SAI

(19UK1A0514)
(19UK1A0505)
(19UK1A0503)
(19UK1A0510)

ABSTRACT

Plant disease and fertilizer recommendation system is an important tool in agriculture to help farmers make informed decisions about the health and care of their crops. A machine learning-based system can be used to analyze large amounts of data and provide tailored recommendations based on the unique characteristics of each crop and its growing environment.

The system can be trained on historical data about crop health, soil type, weather patterns, and other factors that can impact the growth and well-being of crops. This information can then be used to make predictions about which fertilizers and treatments are best suited for each type of crop, based on its specific needs.

In addition to fertilizer recommendations, the system can also provide early warning signs of plant diseases, allowing farmers to take preventative measures to keep their crops healthy. This can save farmers time, money, and effort, as well as reduce the need for harmful chemicals and pesticides.

The system can be further improved over time by incorporating real-time data from sensors and other sources, allowing it to adapt to changes in the growing environment and provide more accurate recommendations. By leveraging the power of machine learning, this type of system can greatly improve the efficiency and productivity of agricultural operations.

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1. OVERVIEW.....	1
1.2. PURPOSE	1
2. PROBLEM STATEMENT.....	2
3. LITERATURE SURVEY	3
3.1. EXISTING PROBLEM	3
3.2. PROPOSED SOLUTION	3
4. THEORITICAL ALANALYSIS.....	4-5
4.1. BLOCK DIAGRAM	4
4.2. HARDWARE AND SOFTWARE REQUIREMENTS	5
5. EXPERIMENTAL INVESTIGATIONS	6
6. FLOWCHART.....	7
7. ADVANTAGES AND DISADVANTAGES	8-9
7.1. ADVANTAGES.....	8
7.2. DISADVANTAGES	9
8. APPLICATIONS.....	10
9. CONCLUSION	11
10. FUTURE SCOPE	12

1. INTRODUCTION

1.1 Overview

Deep learning is a subset of deep learning that involves the use of artificial neural networks to analyze and learn from data. It has been applied in a variety of fields, including agriculture, to develop systems that can analyze large amounts of data and make predictions or recommendations.

In the context of plant disease and fertilizer recommendation systems, deep learning could be used to analyze data on plant growth, soil conditions, weather patterns, and other factors that may affect the likelihood of disease outbreaks or the effectiveness of different fertilizers. This data could include images of plants, sensor readings, and other types of information.

The system could then use this information to make recommendations for the prevention or treatment of plant diseases, or for the use of specific fertilizers. For example, the system might recommend the use of a particular pesticide to prevent a certain type of disease, or suggest the application of a particular fertilizer to improve soil conditions and promote healthy plant growth.

Overall, deep learning techniques can be a powerful tool for developing plant disease and fertilizer recommendation systems that are accurate, efficient, and easy to use.

1.2 Purpose

The purpose of a plant disease and fertilizer recommendation system based on deep learning is to use artificial intelligence and machine learning techniques to analyze data on plant growth, soil conditions, weather patterns, and other factors, and make recommendations for the prevention or treatment of plant diseases or the use of specific fertilizers.

Such a system could be used by farmers, gardeners, or other professionals to improve crop yields, reduce losses due to disease, and optimize the use of fertilizers and other inputs. It could also help to reduce the environmental impact of agriculture by minimizing the use of pesticides and other chemicals and improving soil health.

2. PROBLEM STATEMENT

A plant disease prediction deep learning problem involves using data about plants and their environment to predict the likelihood that a plant will develop a specific disease. This type of problem can be approached using supervised learning, in which a machine learning model is trained on a labeled dataset that includes examples of plants with and without the disease in question. The model can then be used to make predictions about the likelihood that a new plant will develop the disease, based on its characteristics and the conditions it is grown in.

There are a number of factors that can influence the development of plant diseases, including the plant's genetics, its environment (e.g., temperature, humidity, sunlight), and the presence of pathogens (e.g., bacteria, viruses, fungi). To build a machine learning model for plant disease prediction, it is important to gather data on these factors as well as on the presence or absence of the disease in question. This data can be used to train and evaluate the model, with the goal of achieving high accuracy in predicting the likelihood of disease development.

3. LITERATURE SURVEY

3.1 Existing problem:

One existing problem with plant disease and fertilizer recommendation systems based on deep learning is the need for large amounts of high-quality data in order to train and validate the system. Obtaining and curating such data can be time-consuming and costly, and may require the collaboration of multiple organizations or individuals.

Another issue is the potential for bias in the data used to train the system, which can affect the accuracy and fairness of the recommendations. For example, if the data is disproportionately collected from certain regions or types of crops, the system may not be as effective in other areas or for other crops.

Finally, there may be concerns about the interpretability and explainability of the recommendations made by the system, as well as the potential for errors or unintended consequences if the system is not used properly.

3.2 Proposed Solution:

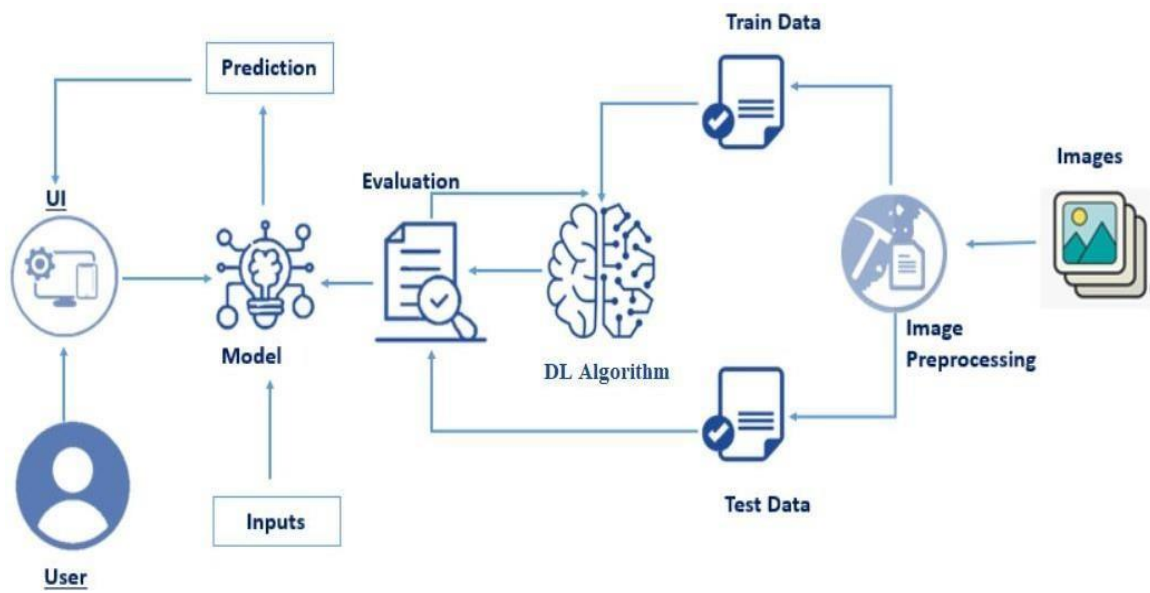
Data collection and curation to improve the accuracy and effectiveness of the system, it is important to collect and curate large amounts of high-quality data from a diverse range of sources. This may involve collaboration with multiple organizations or individuals, as well as efforts to standardize data formats and ensure the data is properly labeled and annotated.

Bias reduction to reduce bias in the data used to train the system, it is important to ensure that the data is representative of the populations and environments for which the system will be used. This may involve efforts to collect data from a wide range of locations, crops, and other factors.

Interpretability and explainability to increase the interpretability and explainability of the system, it may be helpful to develop techniques for visualizing and explaining the decision-making process of the system, as well as to provide context and background information to users.

4. THEORITICAL ANALYSIS

4.1 Block Diagram



4.2 HARDWARE / SOFTWARE DESIGNING

The following is the Hardware required to complete this project:

- Internet connection to download and activate
- Administration access to install and run Anaconda Navigator
- Minimum 10GB free disk space
- Windows 8.1 or 10 (64-bit or 32-bit version) OR Cloud: Get started free, *Cloud account required.

Minimum System Requirements To run Office Excel 2013, your computer needs to meet the following minimum hardware requirements:

- 500 megahertz (MHz)
- 256 megabytes (MB) RAM
- 1.5 gigabytes (GB) available space
- 1024x768 or higher resolution monitor

The following are the software s required for the project:

- Jupyter Notebook
- Spyder

5. EXPERIMENTAL INVESTIGATIONS

An experimental investigation of a plant disease and fertilizer recommendation system based on deep learning could involve several steps:

Data collection and preparation: This would involve collecting and preparing the data that will be used to train and test the system, including images of plants, sensor readings, weather data, and other types of information. The data should be cleaned and pre-processed as needed, and divided into training, validation, and test sets.

Model development: This would involve developing and implementing the deep learning model that will be used to analyze the data and make recommendations. This could involve designing and training a convolutional neural network to recognize plant diseases from images, or using a more general-purpose neural network to analyze other types of data.

Model evaluation: This would involve evaluating the performance of the model on the test data, and comparing its performance to other models or baseline approaches. This could include measures such as accuracy, precision, and recall, as well as more subjective metrics such as the interpretability and explainability of the model's recommendations.

Model deployment: If the model performs well in the evaluation phase, it could be deployed in a real-world setting, such as on a farm or in a garden. This would involve developing an appropriate user interface and providing guidance and support to users as needed.

Overall, the experimental investigation of a plant disease and fertilizer recommendation system based on deep learning would involve a combination of data analysis, machine learning techniques, and user testing in order to develop and evaluate the system.

6. FLOWCHART

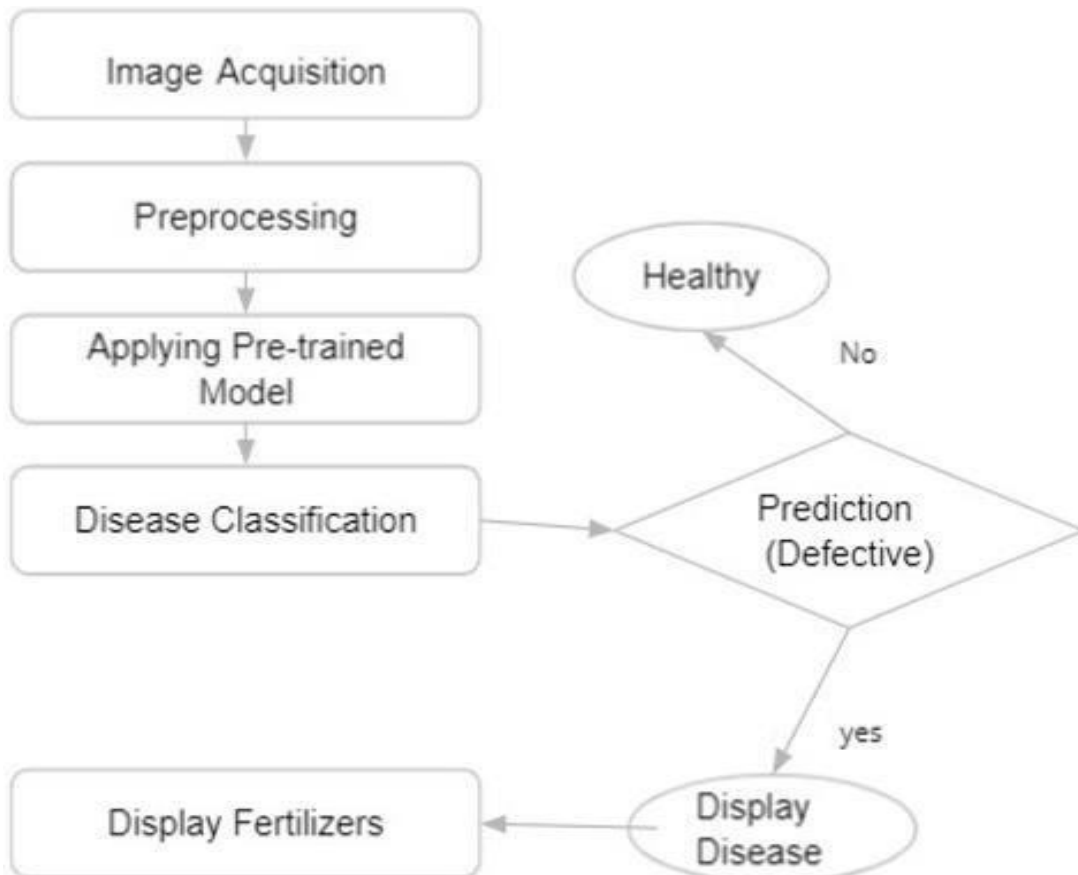


Fig. 2. Flowchart of Training model

7. ADVANTAGES AND DISADVANTAGES

7.1 ADVANTAGES:

Accuracy: Deep learning models can achieve high levels of accuracy when trained on large amounts of data, making them well-suited for tasks such as image recognition or data analysis. This can help to improve the accuracy and reliability of the recommendations made by the system.

Efficiency: Deep learning models can process large amounts of data quickly and efficiently, allowing them to make recommendations in real-time or near real-time. This can be particularly useful in situations where timely decisions are critical, such as in the prevention or treatment of plant diseases.

Scalability: Deep learning models can be easily scaled up or down as needed, making them well-suited for use in a variety of contexts, from small gardens to large commercial farms.

Interpretability: With the proper design and implementation, deep learning models can be made more interpretable and explainable, allowing users to understand the basis for the recommendations made by the system.

7.2 DISADVANTAGES:

Data requirements: Deep learning models require large amounts of high-quality data in order to be trained and validated, which can be time-consuming and costly to obtain.

Bias: There is a risk of bias in the data used to train the system, which can affect the accuracy and fairness of the recommendations made by the system.

Complexity: Deep learning models can be complex and difficult to understand, which may make it challenging to interpret the recommendations made by the system or to debug problems that arise.

Explanation: It may be difficult to explain the basis for the recommendations made by the system to users, which could limit trust and adoption.

Dependency: The system may become dependent on the data used to train it, and may not generalize well to new or unseen data. This could limit its usefulness in a rapidly changing environment.

8. APPLICATIONS

There are many potential applications for deep learning in the development of plant disease and fertilizer recommendation systems. Here are a few examples:

Image recognition: A deep learning system could be trained to recognize plant diseases by analyzing images of infected plants. The system could then provide recommendations for the appropriate treatment, such as the use of a particular pesticide or fertilizer.

Data analysis: A deep learning system could be trained to analyze data on plant growth, soil conditions, and weather patterns to predict the likelihood of disease outbreaks and recommend preventive measures such as the use of specific fertilizers.

Natural language processing: A deep learning system could be trained to understand and respond to questions about plant diseases and fertilization in natural language, allowing farmers or gardeners to get personalized recommendations through a chatbot or other interface.

Predictive maintenance: A deep learning system could be used to analyze data on the health and performance of crops and soil, and provide recommendations for maintenance and repair tasks such as irrigation, fertilization, and pest control.

Overall, deep learning has many potential applications in the development of plant disease and fertilizer recommendation systems, and can be used to improve the accuracy, efficiency, and effectiveness of these systems.

9. CONCLUSION

In conclusion, deep learning techniques offer many potential advantages for the development of plant disease and fertilizer recommendation systems, including accuracy, efficiency, scalability, and interpretability. However, there are also potential disadvantages to consider, including the need for large amounts of high-quality data, the risk of bias, the complexity of the models, the difficulty of explaining the recommendations, and the potential for dependency on the data used to train the system.

To maximize the benefits of deep learning in plant disease and fertilizer recommendation systems, it is important to carefully consider these and other challenges, and to develop and deploy the systems in a way that addresses these issues. This may involve efforts to collect and curate high-quality data, to reduce bias in the data, to increase the interpretability and explainability of the models, and to provide clear guidance and support to users. By addressing these challenges, it should be possible to develop and deploy plant disease and fertilizer recommendation systems based on deep learning that are accurate, efficient, and effective.

10.

. FUTURE SCOPE

There is significant potential for the future development and use of deep learning in plant disease and fertilizer recommendation systems. Some possible areas of focus for future work could include:

Improved data collection and curation: As deep learning models become more sophisticated and data-driven, there will be a need for better methods of collecting and curating data from a wide range of sources. This could involve efforts to standardize data formats and ensure the data is properly labeled and annotated, as well as to develop new types of sensors and other data-gathering technologies.

Bias reduction: As deep learning models become more widely used, there will be a need to address concerns about bias in the data and the recommendations made by the models. This could involve efforts to collect data from a more diverse range of sources and to develop techniques for reducing bias in the data and the models.

Interpretability and explainability: To increase the adoption and trust of deep learning models, there will be a need to develop techniques for making the models more interpretable and explainable, and for providing context and background information to users.

Integration with other technologies: Deep learning models for plant disease and fertilizer recommendation could be integrated with other technologies, such as precision agriculture, to improve their effectiveness and efficiency.

Overall, the future scope of deep learning in plant disease and fertilizer recommendation systems is wide and varied, and will likely involve ongoing research and development efforts in a variety of areas.