SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF DATA SCIENCE AND BUSINESS SYSTEMS

21CSS202T FUNDAMENTALS OF DATA SCIENCE

**Project Review 2**

# LEAF DISEASE PREDICTION

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# ABSTRACT

Leaf disease detection is crucial in agriculture for preventing crop loss and ensuring food security.
Traditional methods of disease detection, which rely on manual inspection, are time-consuming, labor-intensive, and prone to human error. To address these challenges, automated leaf disease
detection systems based on image processing and machine learning techniques have gained prominence. In this study, we propose a robust system for detecting and classifying leaf diseases
using convolutional neural networks (CNNs). High-quality images of leaves are captured and preprocessed to enhance feature extraction. The CNN model is then trained on a dataset containing various leaf diseases, including common ailments such as bacterial spots, early blight,
and powdery mildew. The proposed system shows high accuracy in identifying both healthy and diseased leaves, providing farmers with real-time feedback for early intervention. This approach reduces the need for chemical treatments and enhances crop yield by enabling timely and precise management of plant health. Future work may focus on expanding the dataset and improving detection in complex environmental conditions.
This abstract emphasizes the importance, methodology, and outcomes of leaf disease detection using modern AI techniques.

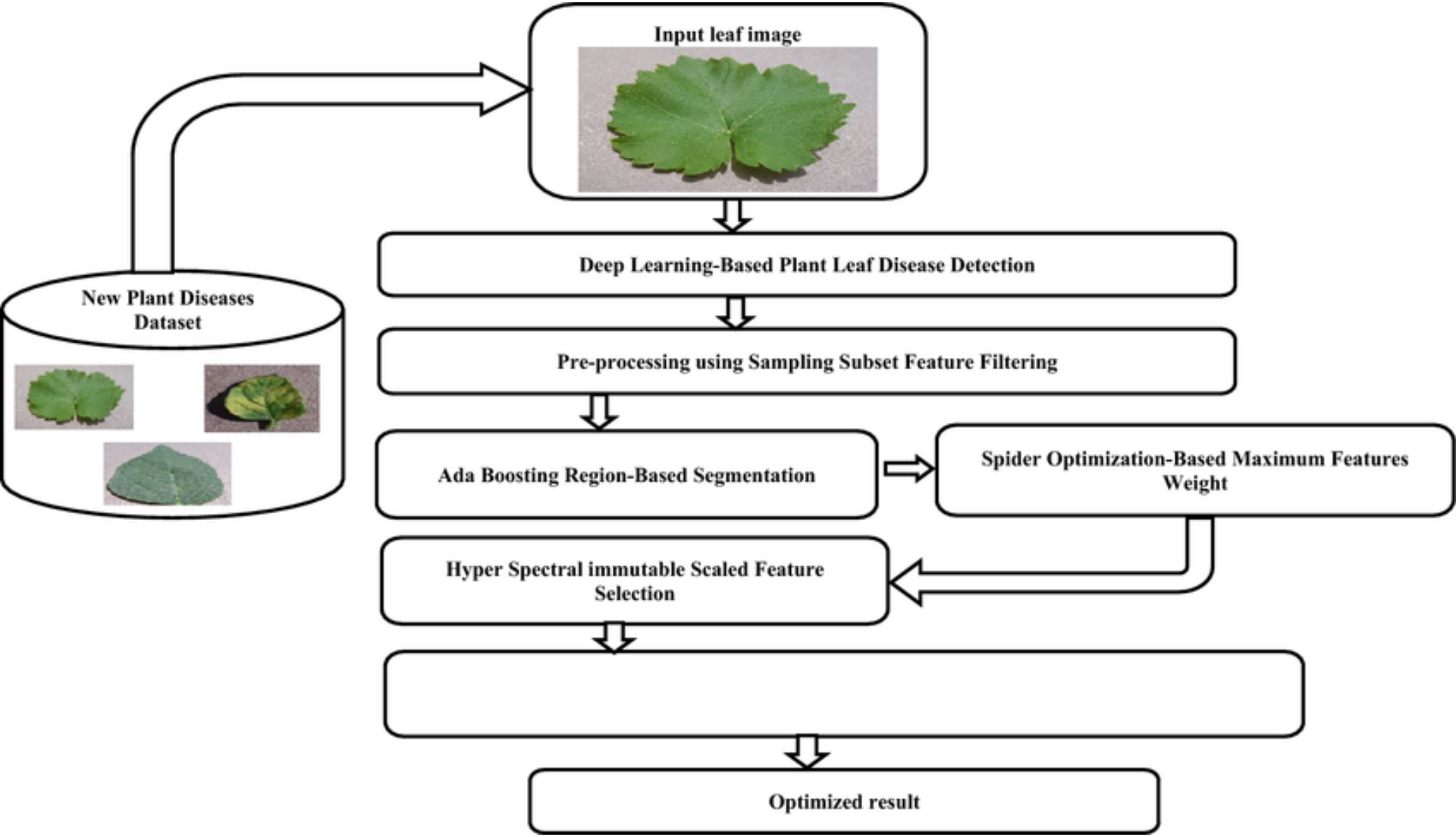
# OBJECTIVES

Leaf disease detection involves identifying and diagnosing plant diseases by analyzing the appearance of leaves. The main objectives for this
process are:

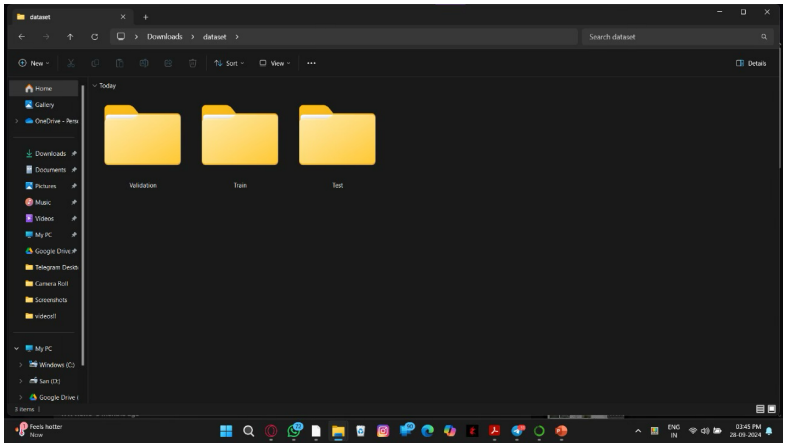
1. **Early Detection**: Identify diseases in their initial stages to prevent further spread and damage to crops.
2. **Accuracy**: Accurately classify different types of leaf diseases to ensure proper treatment.
3. **Real-Time Monitoring**: Enable real-time or near-real-time monitoring to detect diseases as soon as they appear.
4. **Cost-Effectiveness**: Provide a low-cost solution to farmers and agriculturists to help them protect their crops efficiently.
5. **Automation**: Automate the detection process using machine learning, computer vision, or image processing, reducing the need for human
intervention.
6. **Scalability**: Develop a system that can be scaled to different types of crops and environments.
7. **Non-Invasive**: Ensure the detection method is non-invasive, preserving the plant's health while gathering data.
8. **Resistance Management**: Help in managing disease-resistant varieties by detecting patterns of disease susceptibility.
9. **Data-Driven Decision Making**: Provide actionable insights through data analytics to optimize disease management strategies.
10. **Sustainability**: Contribute to sustainable agriculture by minimizing the use of pesticides and reducing crop losses due to disease.

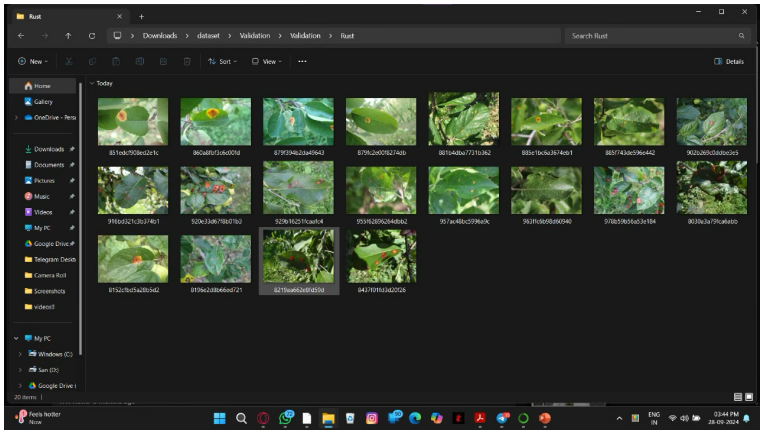
These objectives help in creating an efficient, reliable, and farmer-friendly system for maintaining healthy crops.

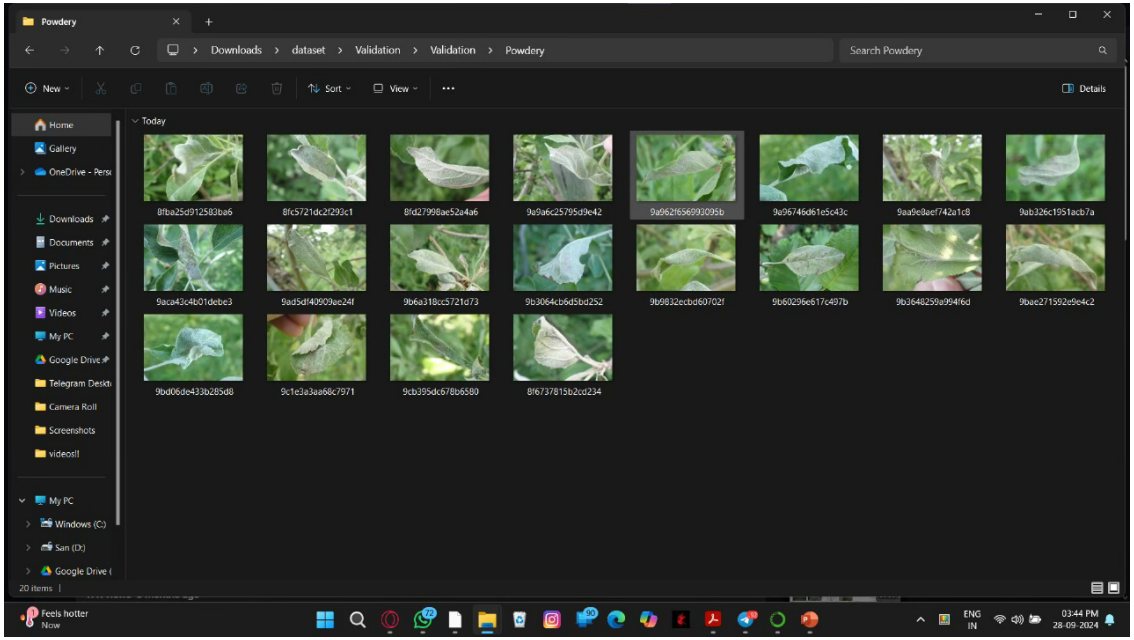
# ARCHITECTURE DIAGRAM



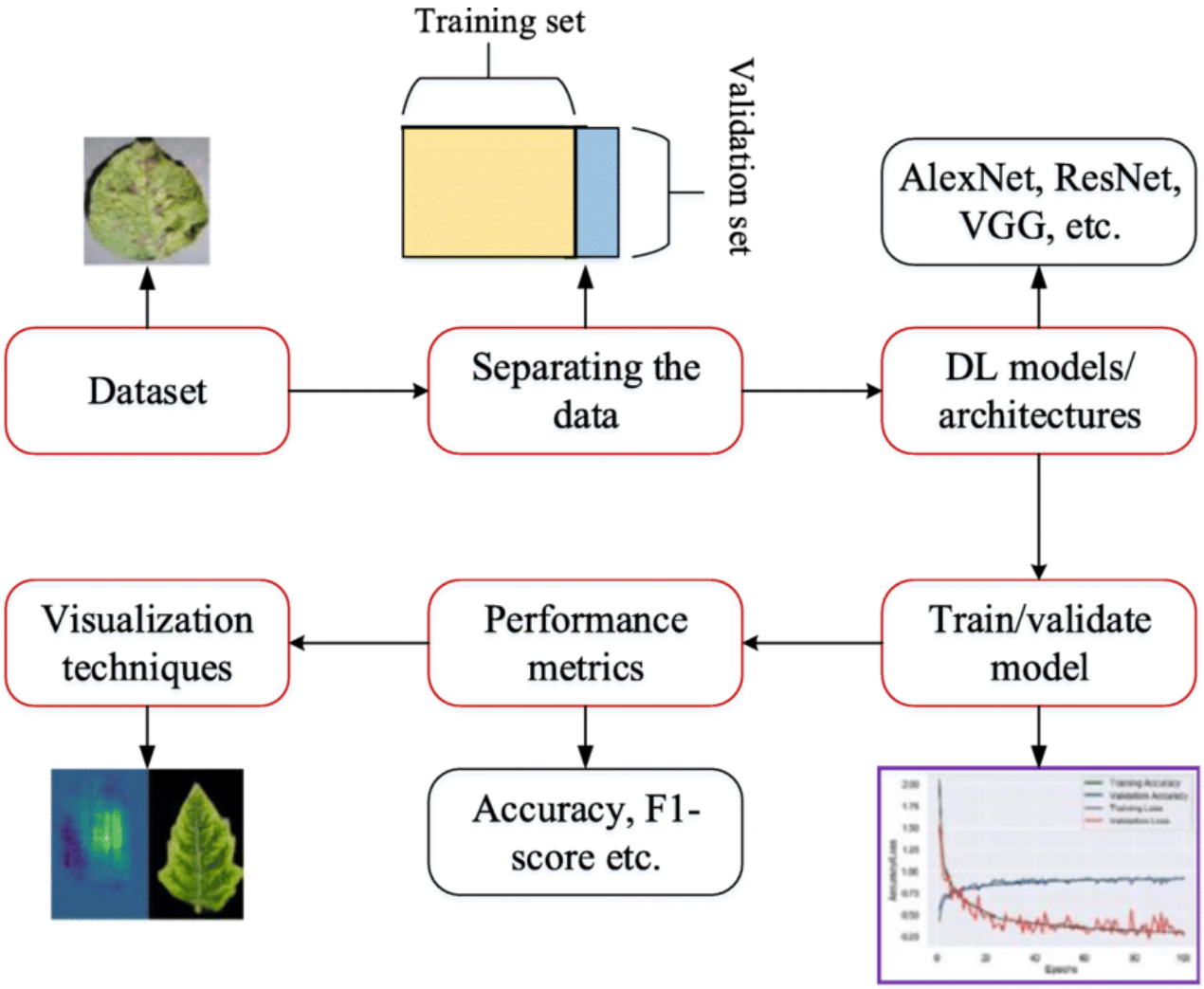
# SAMPLE DATASET



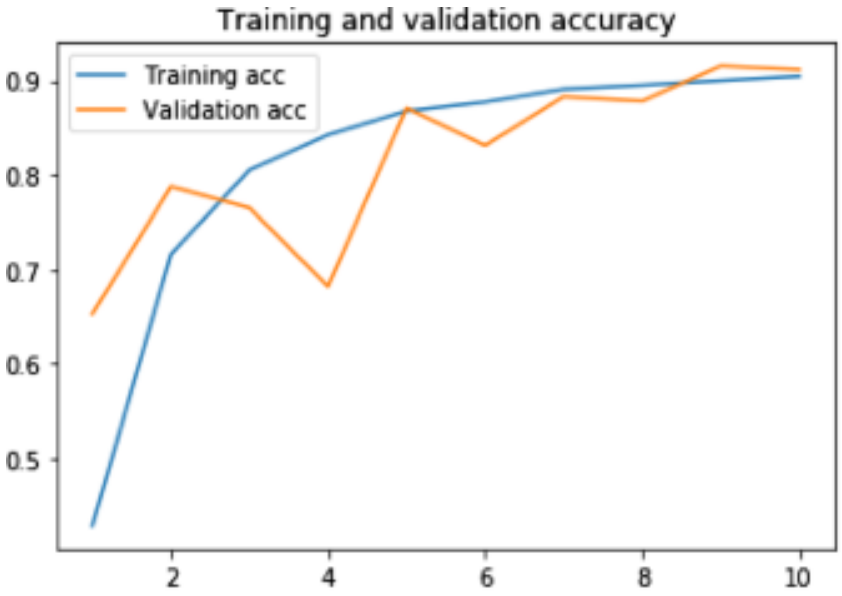



# VIZUALIZATION

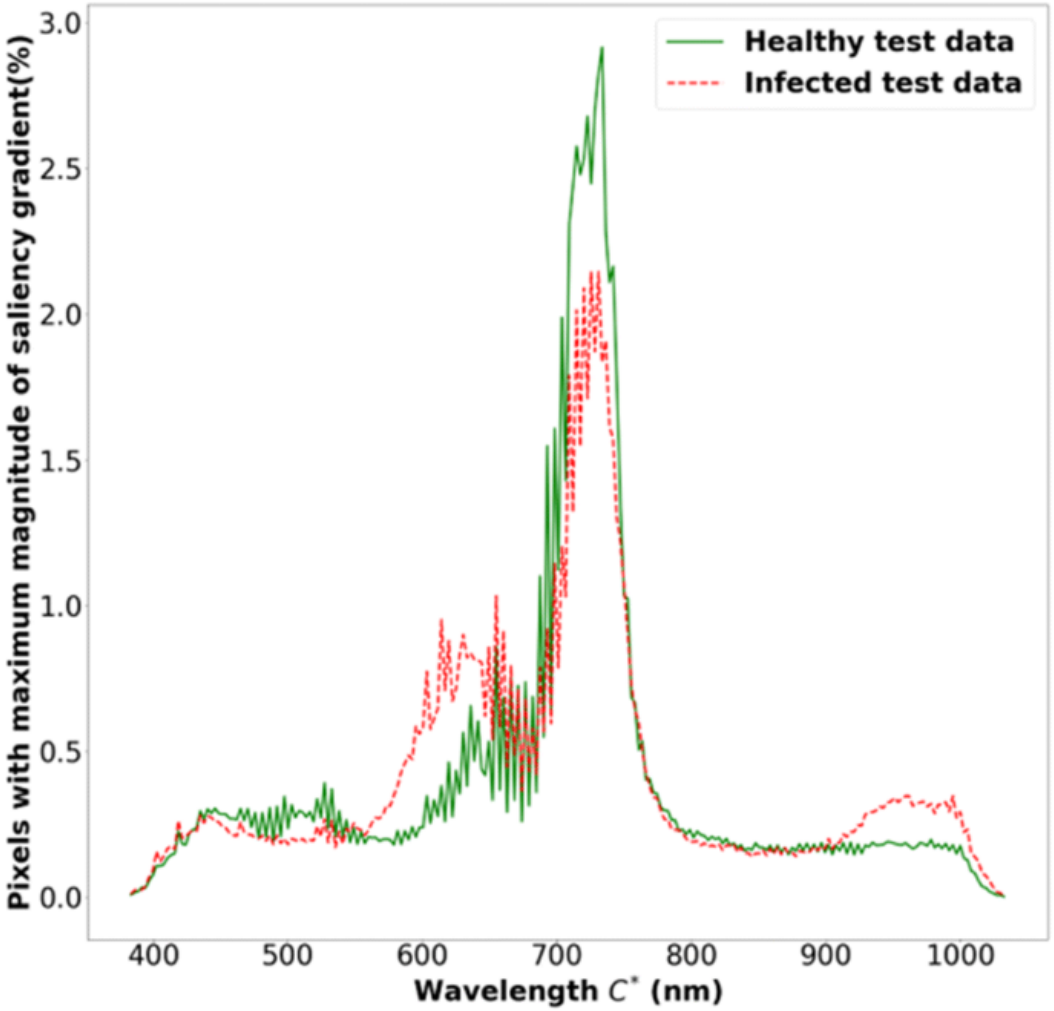


# PLOTS


Training and validation accuracy
Training acc
Validation acc
0.9
0.8
0.7
0.6
0.5
2
4
6
8
10


Training and validation loss
Training loss
Validation loss
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
2
4
6
8
10

# Plant disease identification using explainable 3D deep learning on hyperspectral images



# Conclusion

A conclusion for a project or study on leaf disease detection could be:
In conclusion, the development and application of advanced leaf disease detection methods play
a critical role in modern agriculture and plant health management. By employing technologies
such as machine learning, image processing, and deep learning, significant progress has been
made in accurately identifying and classifying various plant diseases at early stages. Early detection helps in timely intervention, reducing crop losses and improving yield quality. However, challenges such as the need for large and diverse datasets, the complexity of distinguishing visually similar diseases, and the variability in environmental conditions still remain. Future research should focus on enhancing the robustness and scalability of detection
models, integrating multi-spectral imaging, and developing user-friendly applications to make
these technologies more accessible to farmers and agronomists worldwide.
Ultimately, continued innovation in this field will contribute to sustainable agriculture, minimizing the use of harmful chemicals and promoting healthier crops.

# GITHUB REPOSITORY

https://github.com/sansannycodes/leaf-disease-prediction.git

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# Thank you !