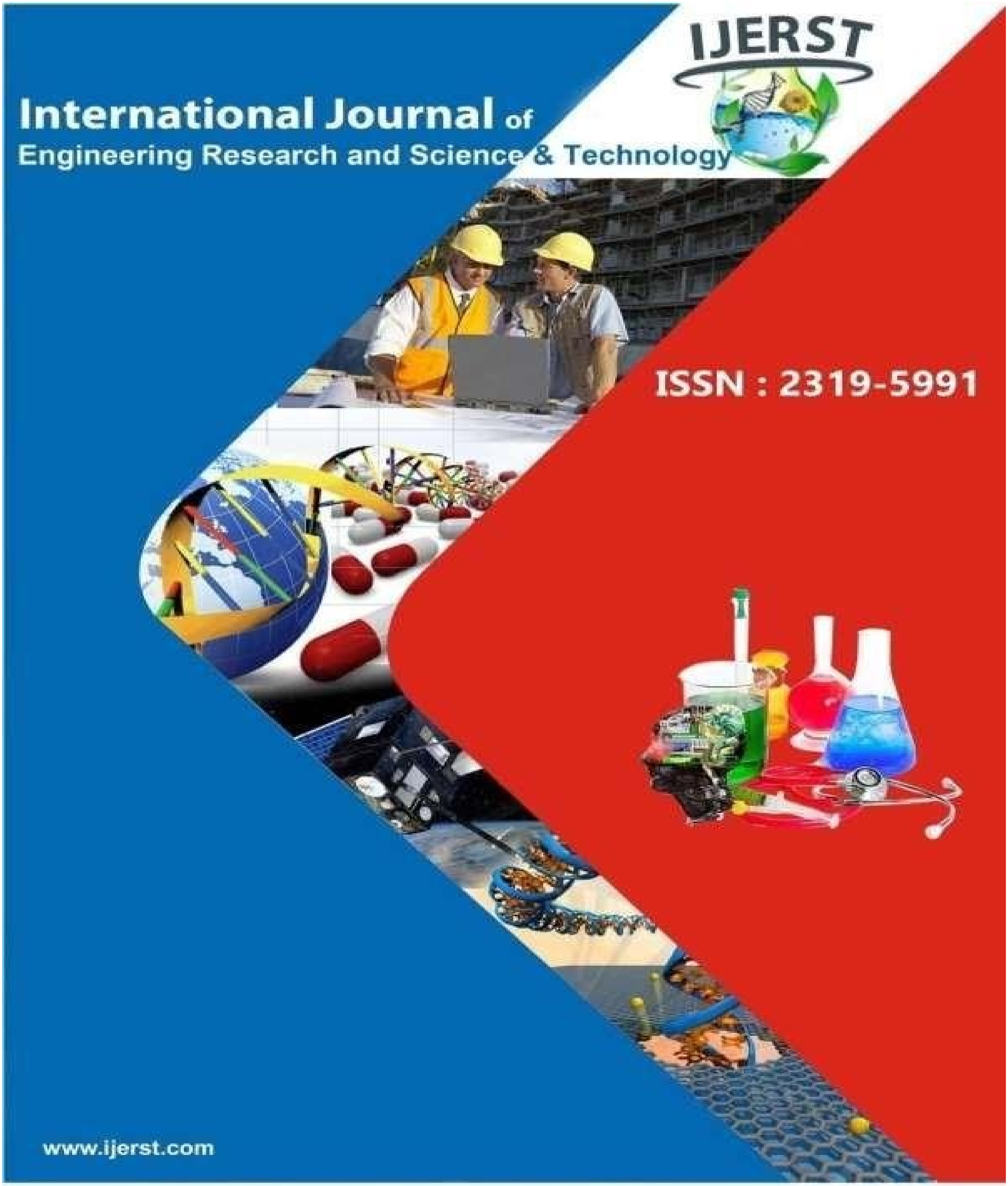

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RICE LEAF DISEASES USING DEEP LEARNING WITH ARTIFICIAL INTELLIGENCE

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ABSTRACT

Agricultural productivity plays a crucial role in the Indian economy, making early detection of rice leaf diseases vital for sustaining crop health and yield. Rice plants are naturally susceptible to various leaf diseases, which, if not identified and managed in time, can significantly affect the quality and quantity of the produce. Automating the detection process helps reduce the extensive manual effort required to monitor large farmlands and enables early identification of disease symptoms as they appear on the leaves. This paper introduces an image segmentation-based algorithm using Neural Networks for the automatic detection and classification of rice leaf diseases. It also surveys various techniques that can be employed for effective identification, highlighting the importance of image segmentation in disease diagnosis.

INTRODUCTION

Rice leaf diseases are a major concern in rice farming, often leading to significant yield losses if not identified and managed promptly. Traditional detection methods rely heavily on manual observation, which is time-consuming, inconsistent, and prone to human error. To overcome these limitations, this project—"Rice Leaf Diseases Using Deep Learning with Artificial Intelligence"—aims to develop an intelligent system capable of accurately detecting and classifying rice leaf diseases through image processing and deep learning techniques. By enabling early diagnosis, the system assists farmers and agricultural experts in taking timely corrective actions, thereby improving crop health, boosting productivity, and reducing economic losses caused by plant diseases.

LITERATURE SURVEY

Valgaev et al. (2016) proposed a power demand forecasting model based on the k-Nearest Neighbours (k-NN) algorithm within the Smart City Demo Aspern (SCDA) project. This model utilized historical daily load curves and their corresponding future values to generate demand forecasts. While k-NN is useful

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for identifying similar patterns in high-dimensional data, it has limitations in directly predicting future values. To overcome this, temporal context was integrated into the model, enabling accurate next-day (24-hour) power demand predictions specifically for workdays.

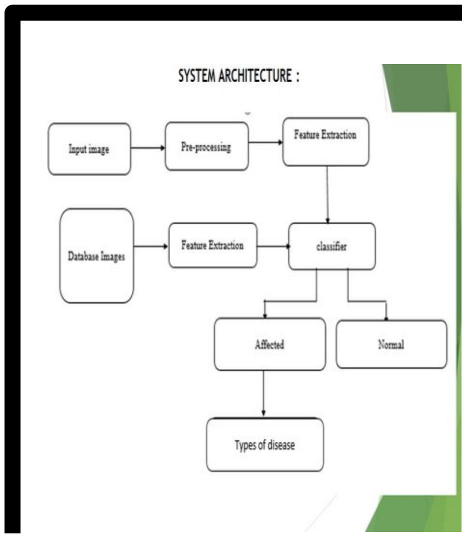
EXISTING SYSTEM

Principal Component Analysis (PCA) helps simplify image data by preserving essential features, enabling faster and more efficient detection of rice leaf diseases. Region-based segmentation further enhances this process by dividing images into distinct areas with similar characteristics, making it easier to isolate and analyze diseased portions. Complementing these techniques, the K-Nearest Neighbors (KNN) classifier compares extracted features with existing labeled data to accurately classify and identify the presence of rice leaf diseases, offering a straightforward yet effective detection method.

PROPOSED SYSTEM

Feature extraction converts raw image data into valuable attributes for analysis, with Convolutional Neural Networks (CNNs) playing a key role by automatically learning layered features such as edges and textures through convolutional layers. To optimize CNN performance, essential pre-processing steps like image resizing, normalization, and data augmentation are applied. Combined, these techniques ensure efficient and precise image analysis across a wide range of applications.

BLOCK DIAGRAM



The detection of rice leaf diseases using deep learning and artificial intelligence involves the collection of a large dataset of rice leaf images with varying conditions of disease. A convolutional neural network (CNN) is typically employed to extract features from these images, which include patterns and textures indicative of specific diseases like bacterial blight, leaf blast, or brown spot. The AI model is trained using labeled images where each image is associated with its corresponding disease type. During the training process, the network learns to distinguish between healthy and diseased leaves by optimizing its weights to minimize classification errors. Once trained, the model can predict diseases in new, unseen images, assisting farmers in early detection and management of rice plant diseases, thus improving crop yield and reducing pesticide usage.

CONCLUSION

The literature review emphasizes the critical role of detecting plant diseases in maintaining both plant health and human well-being. Effective management of plant

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diseases in agriculture requires the use of appropriate techniques. This research focuses on developing a systematic method for detecting and identifying rice leaf diseases, providing valuable support to both farmers and pathologists. The paper highlights the importance of image processing in agricultural applications and suggests that future research should explore the identification of various types of rice leaf diseases.

FUTURE SCOPE

As agriculture plays a crucial role in global food security, the application of Artificial Intelligence (AI) and Deep Learning in crop disease detection offers significant potential. This project, which focuses on identifying rice leaf diseases using AI, can be further developed to greatly benefit the farming community. Future advancements could include the development of a mobile app for instant disease detection and suggestions, making it especially useful in rural areas. The system could also be expanded to detect diseases in other crops like wheat, maize, and cotton. Enhancing the model's accuracy with more diverse data and regional language support could improve accessibility for farmers. Integration with government services for expert advice and alerts, along with the use of drones and IoT devices for monitoring large fields, could further optimize disease detection. Additionally, incorporating treatment and prevention guidance would make the system a comprehensive tool for farmers.

REFERENCES

1. Hong, T., Wang, H., Luo, X., & Yang, R. (2014). State-of-the-art on load forecasting techniques for smart grids. Applied Energy, 231, 103–120.
2. Ahmad, T., Chen, H., Guo, Y., & Wang, J. (2018). A comprehensive overview on the data-driven and model-driven artificial intelligence methods for sustainable building energy forecasting. Energy and Buildings, 199, 323–335.
3. Fan, C., Xiao, F., & Zhao, Y. (2017). A short-term building cooling load prediction method using deep learning algorithms. Applied Energy, 195, 222–233.
4. Deb, C., Eang, L. S., Yang, J., & Santamouris, M. (2017). Forecasting energy consumption in Singapore's commercial buildings using a machine learning approach. Energy, 130, 486–498.
5. Amasyali, K., & El-Gohary, N. M. (2018). A review of data-driven building energy consumption prediction studies. Renewable and Sustainable Energy Reviews, 81, 1192–1205.
6. Zhao, H. X., & Magoulès, F. (2012). A review on the prediction of building energy consumption. Renewable and Sustainable Energy Reviews, 16(6), 3586–3592.
7. Wang, J., Srinivasan, R. S., & Braham, W. (2017). A review of data-driven approaches for prediction and classification of building energy consumption. Renewable and Sustainable Energy Reviews, 82, 1027– 1047.