these challenges and improving the existing techniques, it is possible to achieve accurate and efficient Improve rice production in Bangladesh by detecting rice diseases.

6. Result

The study explored the efficiency of both DL and traditional ML algorithms are being used to detect and classify rice leaf diseases. Three different CNN models were designed and evaluated on a pre-processed rice leaf disease image dataset, with accuracies ranging from 0.54 to 0.93. In addition, three traditional mal algorithms, including SVM, RandomForestClassifier, and kNN, were employed and achieved accuracies ranging from 0.50 to 0.71. Further analysis demonstrated that the SVM algorithm again an accuracy of 58%, while the kNN model has achieved accuracy rate. of 0.50. For the Random Forest Classifier algorithm, the overall accuracy achieved was 0.71. In terms of individual disease classes, the highest precision and recall values were observed in the Random Forest Classifier algorithm for Bacterial leaf blight, with a precision of 1.00 and recall of 0.67. With a precision of 0.70 and a recall of 0.70, the SVM algorithm achieved the highest precision and recall values for Brown spot. Lastly, the kNN algorithm demonstrated the greatest precision and recall values for Leaf smut, with a precision of 0.43 and a recall of 0.50. Overall, the study demonstrates that both DL and traditional ML algorithms can effectively detect and classify rice leaf diseases. These techniques can potentially be applied in rice-producing countries like Bangladesh to improve the efficiency and productivity of the agricultural industry. Further research and development can lead to more advanced models with higher accuracy in detecting and diagnosing a wider range of rice diseases.

7. Conclusion

In conclusion, the application of DL and ML methods has shown promising outcomes in the automated identification and diagnosis of diseases affecting rice plants. These techniques have the ability to accurately identify and classify various types of rice diseases, ultimately improving the efficiency and productivity of the agricultural industry. This is especially significant for Bangladesh, where rice is a staple food and a major contributor to the economy. By utilizing these techniques, significant improvements in rice production and quality can be achieved. Further research and development can result in the development of more advanced products and accurate models capable of diagnosing a wider range of rice diseases. This has the potential to make the agricultural sector in Bangladesh and other rice-producing countries around the world more sustainable and profitable. The leaves of the plants are the main location where diseases are visibly apparent, and different diseases have different effects on the leaves. Rice plants play a key role in global food security because they provide food for over half of the global population. Rice plant diseases have a notable impact on the class and quota of rice produced., causing an estimated 20-40% production loss annually. Manually detecting these diseases requires extensive work and disease knowledge from farmers, making early diagnosis a difficult and expensive task. Automated methods such as ML and DL can perform early detection at a lower cost, ultimately benefiting both farmers and consumers.

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