New app identifies rice disease at early stages

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Rice is one of the most important food crops for billions of people but the plants are susceptible to a wide variety of diseases that are not always easy to identify in the field. New work in the *International Journal of Engineering Systems Modelling and Simulation* has investigated whether an application based on a convolution neural network algorithm could be

used to quickly and effectively determine what is afflicting a crop, especially in the early stages when signs and symptoms may well be ambiguous.

Manoj Agrawal and Shweta Agrawal of Sage University in Indore, Madhya Pradesh, suggest that an automated method for rice disease identification is much needed. They have now trained various machine learning tools with more than 4,000 images of healthy and diseased rice and tested them against disease data from different sources. They demonstrated that the ResNet50 architecture offers the greatest accuracy at 97.5%.

The system can determine from a photograph of a sample of the crop whether or not it is diseased and if so, can then identify which of the following common diseases that affect rice the plant has: Leaf Blast, Brown Spot, Sheath Blight, Leaf Scald, Bacterial Leaf Blight, Rice Blast, Neck Blast, False Smut, Tungro, Stem Borer, Hispa, and Sheath Rot.

Overall, the team's approach is 98.2% accurate on independent test images. Such accuracy is sufficient to guide farmers to make an appropriate response to a given infection in their crop and thus save both their crop and their resources rather than wasting produce or money on ineffective treatments.

The team emphasizes that the system works well irrespective of the lighting conditions when the photograph is taken or the background in the photograph. They add that accuracy might still be improved by adding more images to the training dataset to help the application make predictions from photos taken in disparate conditions.

More information: Shweta Agrawal et al, Rice plant diseases detection using convolutional neural networks, *International Journal of Engineering Systems Modelling and Simulation* (2022). DOI:

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