Smartphone application for agricultural disease detection

An AI-based smartphone application for the real-time detection of disease in wheat.

Technology No. 2024-035

IP Status: Provisional Patent Application Filed

Applications

- High-throughput agricultural disease detection

Key Benefits & Differentiators

- **User-friendly:** smartphone application has a straightforward user interface
- **Real-time detection:** algorithm takes 10-15 seconds to detect fusarium head blight disease

Technology Overview

Fusarium head blight (FHB) is a fungal disease that affects cereal grains such as wheat, barley, oats, and rye. The disease generates toxins that render the plants inedible to both humans and livestock. In the United States, it is the most economically important wheat disease and often results in significant yield loss and reduced grain quality. Identifying wheat infected with FHB is critical, however, current FHB detection models are slow and incompatible with smartphones

Researchers at the University of Minnesota have developed a novel smartphone application for the real-time detection of fusarium head blight (FHB) disease in wheat. This cloud-based application uses a lightweight artificial intelligence model to rapidly detect FHB infection in 10-15 seconds. The application quickly uploads a user's image from the smartphone to the cloud server for detection and modeling. An image is returned that shows the diseased areas marked. This technology has the potential for use in other agricultural applications such as the detection of stress and pest infection.

Phase of Development

TRL: 5-6
Technology has been beta-tested with the wheat Fusarium Head Blight (FHB) disease detection model on a large color image set in which images were taken from arbitrary distances and angles from wheat objects in the field in different days to represent the real world application scenario. The image set was collected, processed, and annotated by Yang's group. The training/validation of the lightweight disease detection model in the smartphone was conducted by Shi and supervised by Yang. The beta version of the technology could process a typical color image captured by the smartphone and obtain disease detection results between 5-10 seconds, depending on the network quality for cloud uploading/downloading and the complexity of objects in the image. The beta version was developed for Android platform only. The team will continue to work on Version 2 for cross-platform applications with enhanced performance in detection modeling and cloud computing and expanded crop disease detection capabilities.

Desired Partnerships

This technology is now available for:
- License
- Sponsored research
- Co-development

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Researchers

- [Ce Yang, PhD](#) Associate Professor, Department of Bioproducts and Biosystems Engineering

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