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A Framework for Real Time Detection and Monitoring towards of Plant Diseases: A Case Study on Use of Web and Mobile Applications on Foc TR4

Marlene M. De Leon* and **Maria Regina E. Estuar**
Ateneo de Manila University, Philippines

The proliferation of Internet of Things (IoT) devices and cyberphysical structures allowed mobile and web applications to be used for early detection and monitoring of plant diseases. The Cloud-based Intelligent Total Analysis System (CITAS) is an intelligent farming system composed of mobile applications, web applications, and wireless sensor networks (WSNs). It aims to detect early and monitor the presence of Fusarium oxysporum cubense TR4 (Foc TR4) on Cavendish bananas cultivated in the Philippines using modeling and analysis.

CITAS Mobile was developed as a data collection tool for farmers. Data collected include: 1) plant leaf images; 2) qualitative plant characteristics; 3) soil WSN parameter readings (e.g., humidity, pH); and 4) GPS coordinates. CITAS Mobile analyzes plant leaf images in real-time to determine the presence or absence of the disease. Data collected by the mobile application are sent to the CITAS Server through its Application Program Interface (API) end-point via mobile internet connection for multidimensional modeling and analysis. CITAS Web provides farm owners and researchers access to historical data collected by CITAS mobile. CITAS Web has the following features: 1) data-entry of soil sample characteristics; 2) database display of farms and plants; 3) historical trend visualization of soil WSN parameter readings; and 4) visualization of multidimensional analysis results involving plant leaf images, microscopic soil images, soil WSN parameter readings, and soil physico-chemical and nutrient characteristics.

CITAS provides a framework for collection, management, analysis, and visualization of plant disease spread in a geospatial interface. Currently, total analysis allows for early detection and monitoring of Foc TR4. Farmers, farm owners, and researchers may use CITAS for early detection and monitoring of other plant diseases through extension of its analysis parameters. Through this study, the framework can be modified and used to monitor other plant diseases.

Biography:

Marlene De Leon earned her Ph.D. in Computer Science degree from the Ateneo de Manila University, Philippines. She currently works as a full-time Associate Professor at the Department of Information Systems and Computer Science (DISCS), where she teaches Software Engineering, Systems Analysis and Design, and Database Management. She serves as one of the mentors in the Ateneo Social Computing Science Laboratory and the Ateneo Java Wireless Competency Center where disaster management systems and healthcare management systems are developed.