APPLICATION OF CONVOLUTIONAL NEURAL NETWORK MODEL FOR DETECTION OF CHILI ANTHRACNOSE

Pepper (Capsicum annuum) is an important crop due to its massive consumption as a seasoning vegetable in Korea and many other countries. Anthracnose disease in chili pepper has caused serious damage to plant growth and reduced yield with apparent symptoms and signs on the fruits. In this study, we report a deep learning-enabled detection model for chili anthracnose among chili pepper disease based on a computer-vision algorithm. The model was developed based on a deep learning architecture based on a Convolutional Neural Network (CNN) that specializes in extracting features from image datasets. Large datasets of expert pre-screened pepper disease images were collected from 'AI Hub', a platform of AI infrastructure. We examined the effectiveness of image preprocessing and data augmentation to create a balanced dataset. The implemented model achieves higher than 90% classification accuracy compared with training and validation dataset. Our results showed that CNN could be the deployable method for digital disease detection. This meaningful success makes the model a useful disease detection tool, and this research could be further extended to develop a mobile application to help millions of farmers directly in the fields.

DETECTING REPETITIVE ICEQUAKES AT LLAIMA VOLCANO, CHILE

The monitoring of active volcanoes can be complicated by the presence of glaciers on or near the volcano. Both volcanoes and glaciers are productive sources of seismic activity and may easily be confused for each other, leading to missed warning signs or false alarms. Cryogenic earthquakes at volcanoes have been studied at only a few locations around the world and there is a ready need to develop robust methods for differentiating volcanic and glacial earthquakes. Here we present the first results of an ongoing study of icequakes at Llaima, one of the largest and most active volcanoes in Chile. The first stage of this study uses data collected by a temporary network of seismometers deployed on or around the volcano in early 2015. A multi-station detection method applied to stations located closest to the glaciers identifies nearly 5000 seismic events that may have been generated by glacial processes over the duration of 2 months. Careful cross-correlation of all event waveforms identifies nearly 200 groups of repeating earthquakes, the largest of which includes 268 events. The persistent and repetitive nature of these events, combined with their waveform characteristics, suggests they originate from a steady glacial source on the flank of the volcano. These results suggest icequakes at Llaima volcano may be more prevalent than previously thought. The next stage of this study will involve careful analysis of seismic and infrasound data collected by an array of instruments deployed in February to April 2019. Ultimately, this study aims to improve daily hazard assessments at ice-covered volcanoes around the world.