Pests Image Recognition System for Myanmar Agriculture

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Abstract — Although agriculture accounts for a high proportion of Myanmar's total GDP of about 29%, it has little capital, knowledge, technology input, and infrastructure support for the agricultural sector, indicating a relatively low growth rate compared to other services and industrial sectors. This study proposes a system that allows users to receive agricultural prices, agricultural news, agricultural technology information, and agricultural customer information. In addition, we would like to propose IoT sensor data transmission, inquiry with experts, and image recognition pest detection system. This system can help solve problems in Myanmar's agricultural sector.

Keywords — Agriculture, Image Classification

I. INTRODUCTION

Myanmar's agriculture is characterized by low productivity, inequality, and high volatility. Despite its potential, the agricultural sector has suffered insufficient investment in basic infrastructure such as rural roads, as well as weak research, expansion, weak statistical systems, inefficient use of water and irrigation systems, and financial support services.

The reasons why farmers suffer from low productivity and poor crop quality are lack of knowledge about agriculture, natural disasters, water supply problems, and information on diseases and pests. This study proposes a system that allows users to see water supply and nutritional information through various agricultural technology information, crop prices, news, agricultural clients, IoT sensors, and if they take pictures of plants and trees damaged by unknown pests, experts answer them or analyze them through image classification models using deep learning.

II. RELATED STUDIES

There are several research and applications related to Myanmar agriculture, and there are applications similar to the proposal system.

[1]'s Htwet Toe mobile application includes a comprehensive agricultural guide to more than 35 domestic crops and supports various aspects of agriculture, from seed selection to harvesting and selling. Provide farmers with localized grain prices to use as a benchmark for negotiating with middlemen. Farmers can send recorded voice messages and receive responses from trained agricultural economists within 12 hours. And, based on geographic data, crop data and satellite weather data, we generate contextual agricultural weather advice for farmers and an action plan to optimize farm productivity. However, the difference from this proposed system is that there is no function to analyze IoT sensor information or pest data.

[2]'s Golden Paddy mobile application utilizes real-time and personalized crop calendars by existing agricultural advisory services. Based on these specific crop calendars, satellite-based insights, agricultural rules and farmer feedback, advice on crop planning, extreme event management, and productivity gains are provided. It provides market prices, products, retailers and buyers profiles, and brokers between farmers and sellers/buyers. It is an application aimed at more than 550,000 food producers, including 450,000 rice paddy farmers in Bago District and 100,000 corn farmers in Shan State. [2] The difference from this proposed system is that there is no function of managing IoT sensor information and analyzing pest data.

III. PROPOSED SYSTEM

A. Edge AI

Basically, it means running AI algorithms locally on hardware devices using edge computing based on data generated by the device without connection. This allows the device to process data within a few milliseconds, providing real-time information. Today, AI processing is mostly done in cloud-based data centers with high-income models that

require massive computing capacity. However, using Edge AI allows AI processing to move part of the AI workflow to the device and retain data on the device.

B. Convolutional Neural Network

A Convolutional Neural Network, also known as CNN, is a class of neural networks that specializes in processing data that has a grid-like topology, such as an image. A digital image is a binary representation of visual data. It contains a series of pixels arranged in a grid-like fashion that contains pixel values to denote how bright and what color each pixel should be. [3]

C. Proposed System

This study proposes an application system that provides users (mostly farmers) with a variety of agricultural technical information, including recently updated crop prices, agricultural news, cultivation methods, pest prevention methods, and harvesting methods. It provides agricultural customer information so that farmers can consult and sell their crops online in advance. It provides e-commerce account information so that farmers can find and purchase agricultural products they need when farming online. In addition, IoT sensors such as temperature and humidity sensors, soil temperature sensors, soil moisture sensors, cameras, and water level sensors are installed so that users can see and manage the sensor information. In addition, the Ministry of Agriculture, Food and Rural Affairs and the Agricultural University of Myanmar will learn the picture data of pests and agricultural damage using CNN techniques to analyze which plants occur when users enter the picture of pests. As a result of the analysis, information on what kind of pests is and why they occur and how to prevent them is shown to the user. Figure 1 is a block diagram of a data analysis system for recognizing pests, which is a key technology of this study.

IV. CONCLUSION AND FUTURE RESEARCH

This study proposes a system that provides users with recent agricultural prices, news, and agricultural technology information. It also provides information on online retailers and customers so that farmers can easily and conveniently purchase agricultural products they need when farming. Information on IoT sensors and information on pests that can occur when farming can be seen and managed by farmers. In addition, if you take and upload pictures of crops damaged by unknown causes or pests, you can find answers through image analysis models and tell them how to prevent them, solving farmers' questions. Not only can you analyze the photos sent by farmers once and show the results, but you can also save them in the cloud and later collect a huge amount of pest image data. The proposed system is configured as a mobile application so that farmers can easily use it. This system can help farmers solve the problems of low productivity and low crop quality that they are suffering from.

REFERENCES

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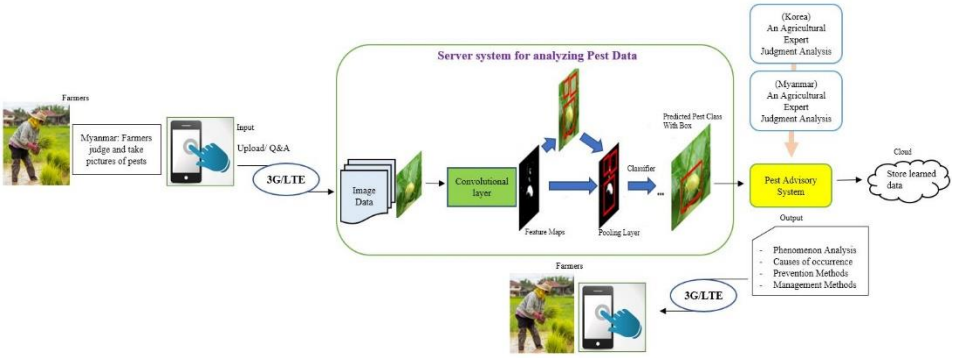

Fig 1. Block diagram of Pest image recognition data analysis system