Hungarian University of Agriculture and Life Science

Szent István Campus
BSc in Agricultural Engineering

Abstract

Development of an Agriculture Technology: A Case Study of Digital Image and Machine Learning in Plant Disease Identification

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This thesis focuses on the use of digital imaging, machine learning to aid in the diagnosis of diseases affecting Maize crops in the context of precision agriculture. In this paper, the author uses the example of Agrio which is an artificial intelligence-controlled mobile application in helping to solve the problem of shortage of expertise among the growing small-scale farmers in the developing world. In line with this, the thesis reviews the literature to understand how artificial intelligence influences new agriculture.

Qualitative assessment in combination with quantitative assessments of the diagnostic performance of Agrio was conducted with Android and iOS users in parallel, as well as original field images and internet sources of images. The evaluation shows that Agrio has good diagnostic capability with high-quality images, however poor or low-quality images or multiplicity of diseases affect the diagnostic analysis. The study points out the need to continuously optimize AI models in order to increase diagnostic probability in various environmental scenarios.

Furthermore, the thesis demonstrates how Agrio narrows the gap between farmers and agronomists by avoiding the use of complex terminologies. As the application provides a direct line of communication to agronomic specialists, fast response and help can be provided for the farmers that could enhance the kind and extent of farming practices in the region. This functionality places Agrio as a critical enabler of smallholder farmers to have a wide range of information in their fingertips to better improve agricultural technologies that will translate to a more efficient agricultural output. The thesis concludes with recommendations for enhancing the app's diagnostic capabilities and further integrating AI-driven support systems in precision agriculture.