Oral Session | Postharvest Machinery

[4-1445-D]Postharvest Machinery

Chair:Yukiharu Ogawa(Chiba University, Japan)
Wed. Sep 4, 2019 2:45 PM - 3:15 PM Room D (4th room)

2:45 PM - 3:00 PM

[4-1445-D-01]A Numerical Procedure for Supporting Garlic Root Trimming Machines Using Deep Learning Algorithms

*Thuyet Quoc Dang[1], Morinobu Matsuo[1,2], Takeshi Haji[1], Tetsuo Kawaide[1], Yuichi Kobayashi[1] (1. Institute of Agricultural Machinery, National Agriculture and Food Research Organization(Japan), 2. Central Region Agricultural Research Center, National Agriculture and Food Research Organization(Japan))
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Smart agricultural machinery is indispensable for modern postharvest processes for reducing human labor force, safety and increasing productivity. This study introduces a method to detect and evaluate the root trimming condition of garlics based on garlic images or the live streaming video from a personal computer webcam using convolutional neural network algorithms. This was an artificial intelligence system utilizing transfer learning techniques in deep learning. We aimed to develop a real-time classification system of garlic during the root trimming process and to provide signals to autonomously control a garlic trimming machine. The classification considered as three classes namely, good, bad and scratch. The good class consisted of successfully trimmed garlics whereas the bad class consisted of incompletely trimmed garlics which required further trimming. The scratch class consisted of defective garlics that should be removed during garlic postharvest processes. The classification system was automatically operated when a garlic was placed under the webcam. The analysis results were sent to two replays via serial ports for further automation processes. It effectively classified images for root trimming. The classification was instant, and its accuracy was about 96%. The signal can be used to develop an unmanned trimming machine. This system has the potential for high-impact applications in agricultural imaging, especially in postharvest machinery.