Scientists propose novel algorithm to identify authenticity of crop varieties

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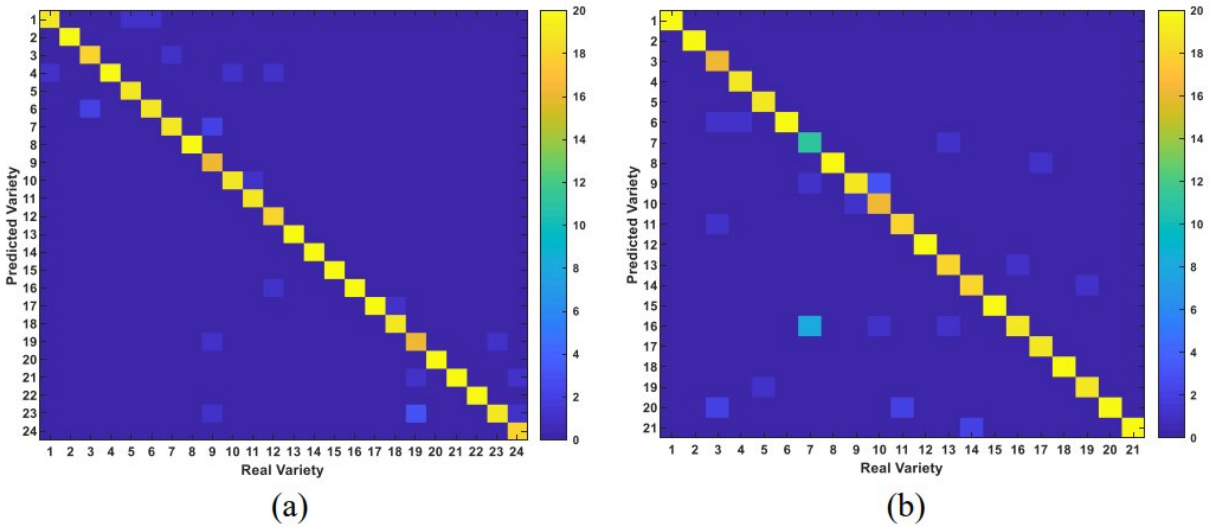

Heat maps of the confusion matrices of wheat (a) and rice (b) sample sets identified by InResSpectra. Credit: Xu Zhuopin

Researchers from the Hefei Institutes of Physical Science (HFIPS) of the Chinese Academy of Sciences have developed a new algorithm for near-infrared spectroscopy (NIRS) that is suitable for high-throughput identification of the authenticity of crop varieties. Results were published in *Infrared Physics & Technology*.

The authenticity of crop varieties is of great significance in varietal protection and seed breeding. Traditional methods for authentic

identification of crop varieties, such as DNA molecular identification, isoenzyme identification, and field identification, have the disadvantages of complicated operations, time-consuming processes, sample damage, environmental pollution, and lagging detection results. Therefore, an effective method is urgently needed.

As a rapid detection technology, NIRS is environmental-friendly, highly-sensitive, and non-destructive.

In this study, the self-developed high-throughput seed quality sorting instrument based on NIRS has achieved the rapid identification and sorting of individual seeds.

Based on this instrument, the researchers proposed an improved convolution neural network—the InResSpectra network, to help achieve more accurate seed variety identification. This optimized inception network removed the 1 × 1 convolution branch to reduce the complexity of the model, and increased the residual element of the ResNet network, which accelerated the training of the neural network and improved accuracy.

The researchers applied the developed system and the InResSpectra network for the identification of 24 wheat varieties and 21 rice varieties, and achieved 95.35% and 93.07% accuracy, respectively, providing an effective method for the spectroscopic identification of the authenticity of crop varieties.

More information: Xiaohong Li et al, Research on high-throughput crop authenticity identification method based on near-infrared spectroscopy and InResSpectra model, *Infrared Physics & Technology* (2022). DOI: 10.1016/j.infrared.2022.104235

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