UPOV
International Union for the Protection of New Varieties of Plants

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Technical Working Party on Automation and Computer Programs **TWC/39/8**

Thirty-Ninth Session
Alexandria, United States of America, September 20 to 22, 2021

Original: English
Date: September 14, 2021

OPTICAL MARKERS: NEW TECHNOLOGY APPLIED FOR BARLEY, WHEAT & SOYBEANS VARIETY RECOGNITION

Document prepared by an expert from Argentina

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The annex to this document contains a copy of a presentation on “Optical Markers: new technology applied for barley, wheat & soybeans variety recognition”, prepared by an expert from Argentina, to be made at the thirty-ninth session of the TWC.

[Annex follows]

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OPTICAL MARKERS

NEW TECHNOLOGY APPLIED FOR BARLEY, WHEAT & SOYBEANS VARIETY RECOGNITION

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Via Image Processing, Artificial Intelligence and Internet of Things.

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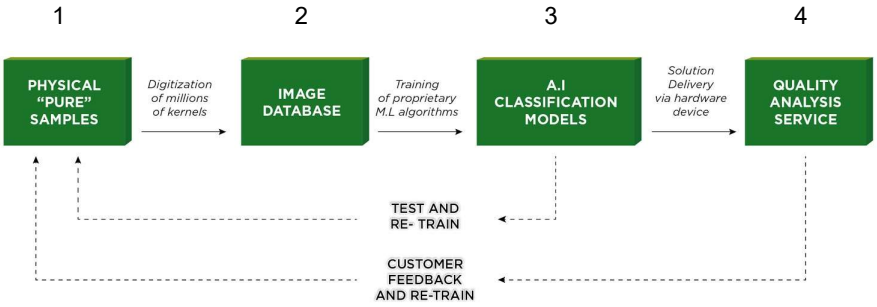
ARTIFICIAL INTELLIGENCE

Trains it´s needed on proprietary convolutional neural networks. Workflow:



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1 – PHYSICAL PURE SAMPLES

Models are trained with pure samples provided by the breeders and seed companies.
In order to have strong and accurate models, the software needs to be trained with as much variability of sources, harvest year and location as posible.

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2 - IMAGE DATABASE

Already has been digitized and built a database of more than 80 million images of different individual kernels of more than 200 varieties from different species from 18 different countries.

3 – ARTIFICIAL INTELLIGENCE CLASSIFICATION MODELS

After training their propiertary algorithms, the models are ready to identify and differentiate varieties in blind test samples.

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4 – QUALITY SERVICE ANALYSIS

Once models are ready, the solution (software) is delivered to labs and sampling points via a hardware device to perform the tests.

The results are constantly being validated against traditional methods

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Harvest after harvest it´s adds new varieties that are being approved to be commercialized and more simples to add more variability to the varieties that were already included in the model

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A Device with one side scanner that can identify varieties for Barley and Wheat.

1. The sample is placed on the scanner.
2. A down-side Scanner takes an image
3. Based on morphological features from the image, the software gives a result in three minutes

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MALTING BARLEY VARIETY RECOGNITION

A Software (ZoomAgri®) that recognizes barley varieties within a sample by analysing morphological characteristics on a single-kernel basis.

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MALTING BARLEY VARIETY RECOGNITION

Breeders, malsters, exporters, grain collectors, private laboratories and brewers have been using it for almost **four years with excellent feedback and acceptance**.

200 devices has already been installed at 17 different countries.

Some companies are already using the technology.

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MALTING BARLEY VARIETY RECOGNITION
Project Status

Latin America
- 92 ZoomAgri® devices installed
- Last harvest 65,000 analyses were done in Argentina (about 100% of malting barley production)
- Starting the process to obtain official approval from INASE

Europe
- 80 ZoomAgri® devices installed
- Ring tests with BIPEA and MEBAK to become specific method

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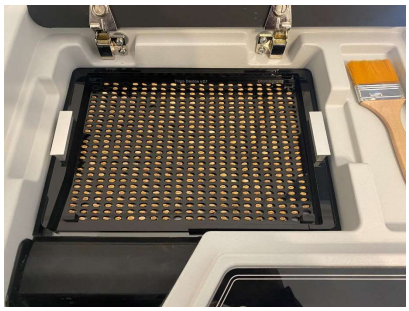
WHEAT VARIETY RECOGNITION

Project Status

- Argentina: Identify and differentiate 32 different varieties and collecting samples to add more. Devices installed at Breeder labs, mills and at the laboratory that is the reference for identifying wheat varieties.



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Two side scanner device that can identify Soybean Varieties

1. The sample is placed on the device.
2. The up-side Scanner takes an image
3. The software processes the image and gives a result in two minutes.

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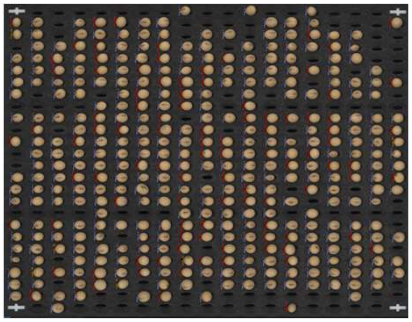
SOYBEANS VARIETY IDENTIFICACION

Project Status

- Argentina: In development together with the main seed companies. First version with excellent results differentiating 47 different varieties and collecting samples to add more.



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The technology has the potential to be adapted to all species

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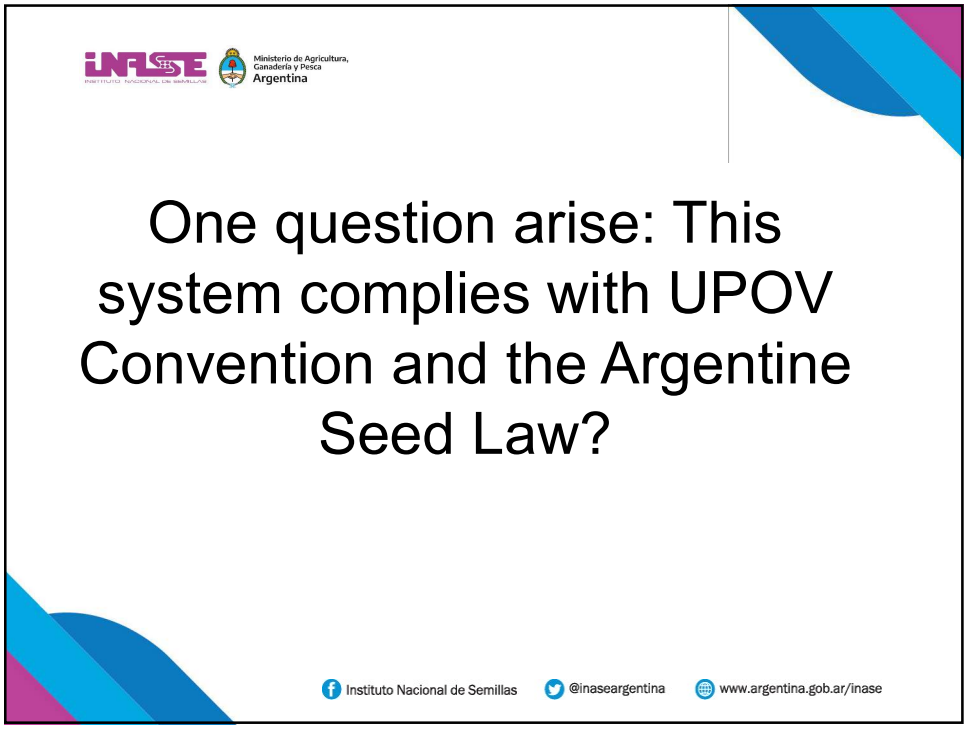

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