

第一回“Global Wheat Head Detection Challenge”のご案内

単位面積当たりの穂数は収量の主な構成要素であることから、麦類の生産力検定試験では必須の調査項目である。現在は複数の調査者が肉眼によって計数しているため、精度や処理できるプロット数に限界がある。そこで、画像解析や深層学習を使って穂計数を自動化する研究も挙げられているが、それぞれの実験データしか対象として穂検出モデルを作成していないので、異なる栽培条件、品種に汎用性がないのが現状である。

そこで、7か国、9研究機関の十数名の研究者が様々な栽培条件や品種あるムギ穂の供試画像とそのラベルデータを集めて、Global Wheat HEAd deTectiOn (Global WHEAT)データセットを作成した。2020年5月4日に、Kaggleを經由して第一回“Global Wheat Head Detection Challenge”を開催することとなった。

本チャレンジは、IPPN(International Plant Phenotyping Network)組織下のイベント CVPPP2020 (COMPUTER VISION PROBLEMS IN PLANT PHENOTYPING)のハイライトイベントでもあり、その成果の発表は、2020年8月イギリスで開催するコンピュータビジョンのトップカンファレンスの一つである ECCV2020で行われる。

本チャレンジでは、カナダの GIFS、日本のクボタ、フランスの DigitAG、Hiphen、日本の Quantomics、および Science | AAAS の学術雑誌 Plant Phenomics からご協賛いただきました。

一等賞 8000USD! 賞金総額 15000USD!

追加情報:

CVPPP 2020 公式ウェブサイト:

<https://www.plant-phenotyping.org/CVPPP2020-CfP>

Global WHEAT 公式ウェブサイト:

<http://www.global-wheat.com/>

Global WHEAT 公式 Kaggle ウェブサイト:

<https://www.kaggle.com/c/global-wheat-detection/overview>

チャレンジオーガナイザー:

- CAPTE (INRAe - Arvalis - HIPHEN, <http://umt-capte.fr>)
- The University of Tokyo, NARO (Japan, <https://www.u-tokyo.ac.jp>)
- The University of Queensland (Australia, <https://agriculture.uq.edu.au/>)
- The University of Saskatchewan (Canada, <https://www.cs.usask.ca>),
- Rothamsted Research (Great Britain, <https://www.rothamsted.ac.uk/>)
- ETH Zurich (Switzerland, <https://usys.ethz.ch/>)

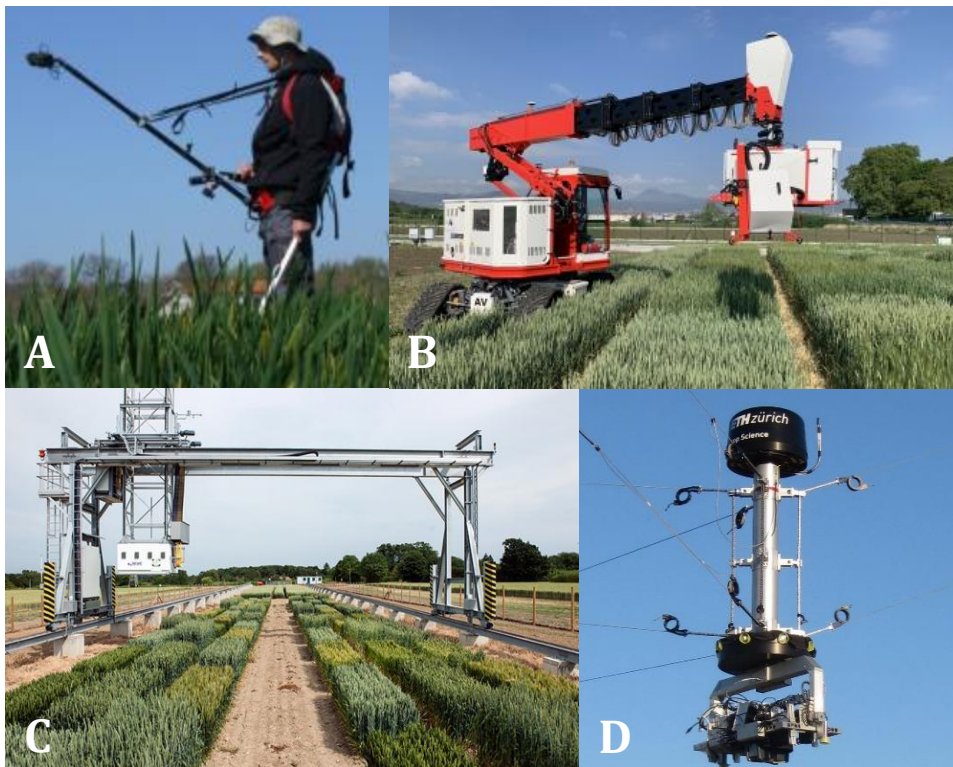
Global WHEAT データ責任者:

Wei Guo, University of Tokyo

Etienne David, Arvalis / INRAE

Simon Madec, Arvalis / INRAE

1- Illustrations



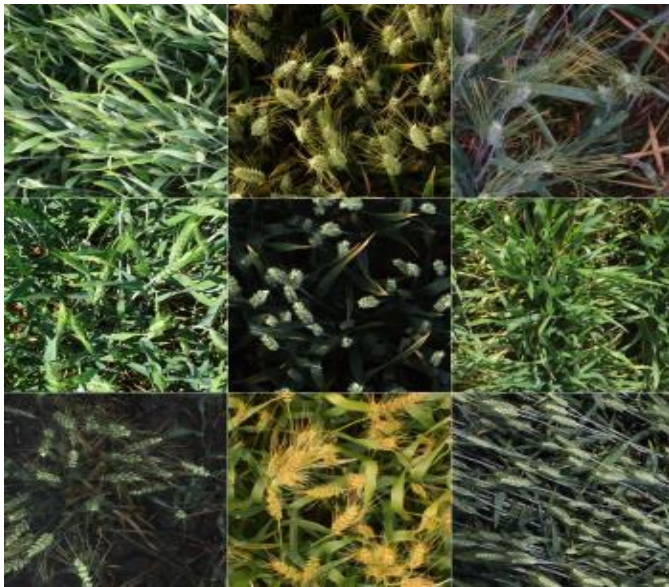
Crédit : A – Arvalis, B- INRAE, C- Rothamsted Research, D- ETH Zürich

ENGLISH : Photo caption / Different methods of open-field image acquisition have been developed throughout the world, with low cost methods (A), robots (B), gantries (C), or cable-suspended (D)

FRENCH : Légende photo / Différentes méthodes d'acquisitions d'images en plein champs ont été mises au point à travers le monde, avec des méthodes low cost (A), des robots (B), ou bien des portiques (C-D).

JAPANESE : キャプション / 様々な圃場における画像の取得方法が世界中で開発されており、低コストの方法 (A)、ロボット (B)、ガントリー (C)、懸垂ケーブル式 (D) などがある。

CHINESE : 图像说明 / 世界各地开发出了不同的田间图像采集方法, 有低成本的方法 (A)、机器人 (B) 龙门架 (C) 或悬挂式 (D)。



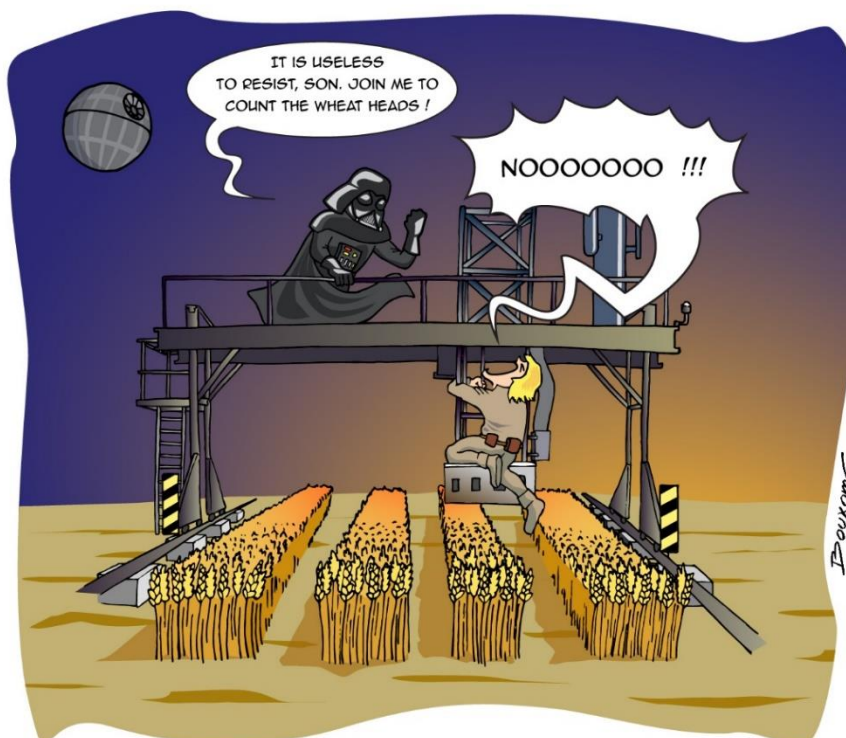
Crédit : Etienne David

ENGLISH : Photo caption / Counting wheat head by image analysis remains a major unresolved challenge to date.

FRENCH : Légende photo / Le comptage d'épis par analyse d'images reste un défi majeur non résolu à ce jour.

JAPANESE : キャプション / 画像解析による小麦の穂数の計数は、現在でも大きな未解決の課題となっています。

CHINESE : 图像说明 / 通过图像分析数麦穗数目，至今仍是一个尚未解决的重大难题。



MAY THE 4TH BE WITH YOU AND FACE THE GLOBAL WHEAT HEAD DETECTION CHALLENGE ON KAGGLE !

Credits: Global Wheat Head Challenge

2- Presentation of Global Wheat Head Detection Challenge

ENGLISH

An international computer science competition to count wheat heads more effectively, using image analysis

The Problem

For several years, agricultural research has been using sensors to observe plants at key moments in their development. However, some important plant traits are still measured manually. One example of this is the manual counting of wheat heads from digital images - a long and tedious job. Factors that make it difficult to manually count wheat heads from digital images include the possibility of overlapping heads, variations in appearance according to maturity and genotype, the presence or absence of barbs, head orientation and even wind.

The Need

There is the need for a robust and accurate computer model that is capable of counting wheat ears from digital images. This model will benefit phenotyping research and help producers around the world assess Head density, health and maturity more effectively. Some work has already been done in deep learning, though it has resulted in too little data to have a generic model.

The Competition

The **Global Wheat Head Challenge**, an international data science competition, was created to address this need. The objective is to have a software model capable of locating heads on a wide variety of data, without bias. Data Scientists, hackers, scientists and the curious re invited to join forces with us to solve this challenge!

Details:

- The competition will run on the Kaggle platform from **April to July 2020**.
- International consortium, Global Wheat Dataset, has made more than 190,000 wheat heads available for this competition. Participants are invited to submit software models, based on this dataset, for counting wheat heads effectively.

Competition organizers

- CAPTE (INRAe - Arvalis - HIPHEN, <http://umt-capte.fr>)
- The University of Tokyo, NARO (Japan, <https://www.u-tokyo.ac.jp>)
- The University of Queensland (Australia, <https://agriculture.uq.edu.au/>)
- The University of Saskatchewan (Canada, <https://www.cs.usask.ca/>),
- Rothamsted Research (Great Britain, <https://www.rothamsted.ac.uk/>)
- ETH Zürich (Switzerland, <https://usys.ethz.ch/>)

Prize

The total prize is \$15,000 USD, sponsored by the [Global Institute for Food Security at the University of Saskatchewan, Canada](#).

For full details on the competition and on how to participate, visit: www.kaggle.com and www.global-wheat.com

An international competition to better count heads by image analysis

In the era of digital agriculture, monitoring crops with imaging-based sensors is becoming widely applied in the field. Compared with the conventional manual technique, generally this allows to collect traits that reflect the status of crop growth and development more efficiently and with a higher accuracy. Wheat is one of the major staple crops. Among the traits of interest, head density, number of heads per unit area, is crucial to assess the tillering capacity and estimate yield. However, due to the overlapping between heads, it is challenging to investigate head density from digital imagery. Obviously, deep learning techniques are suitable to tackle this problem. This motivates us to initialize this competition, "Global Wheat Head Challenge".

It is hosted by the Kaggle platform, recognized as the first in agriculture domain (website). To achieve a robust model, a dataset of more than 190,000 heads annotated with images from very diverse conditions is made available to participants by the international consortium Global Wheat Dataset (website). The competition is co-organized by UMT CAPTE (INRAe - Arvalis - HIPHEN, <http://umt-capte.fr>), the University of Tokyo, NARO (Japan), the University of Queensland (Australia), the University of Saskatchewan (Canada), Rothamsted Research (Great Britain), ETH Zurich (Switzerland) and Nanjing Agricultural University (China).

Thanks to the support of the Global Institute for Food Security (www.gifs.ca). The competition will be held from 4th May to 4th August. The final result will be released on ECCV conference during CVPPP workshop end of August (to be determined). The top 3 teams will be invited to attend the conference with a prize of \$15,000 for the most successful teams. You can find more detailed information on website.

We therefore invite Data Scientists, hackers, scientists and the curious to join forces with us to solve this challenge!