**INFO 7390 ADVANCES IN DATASCIENCE AND ARCHITECTURE**

**FINAL PROJECT**

**Team Members**

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**GOALS AND IMPORTANCE OF THE PROJECT:**

Detecting wheat heads from outdoor images of wheat plants, including wheat datasets from around the globe.

Dataset: <https://www.kaggle.com/competitions/global-wheat-detection/data>

The goal is to predict bounding boxes around each wheat head in images that have them. If there are no wheat heads, you must predict no bounding boxes.

In your regular day, you’re likely to find usage of several wheat products. Indeed, wheat is a mostly relied common grain and its popularity among food and crop makes it widely studied. To get large and accurate data about wheat fields worldwide, plant scientists use image detection of "wheat heads"—spikes atop the plant containing grain. These images are used to estimate the density and size of wheat heads in different varieties. Detection of wheat heads is an important task allowing to estimate pertinent traits including head population density and head characteristics such as sanitary state, size, maturity stage and the presence of awns. However, accurate wheat head detection in outdoor field images can be visually challenging. There is often overlap of dense wheat plants, and the wind can blur the photographs. Both make it difficult to identify single heads. Additionally, appearances vary due to maturity, colour, genotype, and head orientation.

Finally, because wheat is grown worldwide, different varieties, planting densities, patterns, and field conditions must be considered. Models developed for wheat phenotyping need to generalize between different growing environments. We have done Keras implementation of Mask- RCNN for Global Wheat Detection and tried implementing detection methods: one- and two-stage detectors (Yolo-V3 and Faster-RCNN). Models developed for wheat phenotyping need to be able to generalize between environments. With successful implementation of this Wheat Detection, researchers can accurately estimate the density and size of wheat heads in different varieties.