



# MASTER THESIS

## Automatic Ear Detection Based on 3D Point Clouds



### OBJECTIVES

- Develop an algorithm for automatic ear detection and counting
- Infer different characteristics of the ears, such as:
  - Length
  - Width
  - Number of kernels
  - Growth over time

### REQUIREMENTS

- Matlab prototyping
- C++
- Computer Vision I & II
- Interested / expertise in Machine Learning
- Familiar with Linux distributions
- Fluent in English (Dutch or German not required)

### DESCRIPTION

Plant researchers and breeders need to assess morphological features of plants to determine their performance. For wheat – one of the major crops worldwide – the number of ears per plant (and other descriptive parameters of the ears) is assessed manually by hand for millions of plants per year. With PlantEye – a 3D Laser scanner device - Phenospex generates 3D point clouds in research stations across the globe that are used to extract descriptive features such as plant height, leaf area or the angles of leaves. Typical experiments with several 1000 plants that are scanned up to 12 times a day over the course of 3 months can contain millions of high quality 3D point clouds.

The automatic extraction of interesting features such as the ears of wheat plants would be a major benefit for researchers that apply such technologies. The scope of this project is to develop and validate an algorithm that can quantify the number of ears on wheat plants. In addition, qualitative parameters such as the size of the ears or the number of kernels should be estimated. The evaluation dataset contains thousands of point clouds with a 1 mm resolution and is completely annotated with manual characteristic measurements of the plants.

Part of this project should be done at Phenospex in Heerlen (up to 4 weeks). During this stay Phenospex will arrange accommodation and cover travel costs in Maastricht, a young, vibrant and international city in the triangle of Belgium, Germany and the Netherlands. Our office is located 20 minutes away from Maastricht and easily reachable by train or car from there.

### CONTACT



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Smart Technologies for Plant Analysis



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