Image Processing in the National Plant Phenomics Centre

Andrew Tindall
Department of Computer Science, Llandinam Building,
Aberystwyth University, Aberystwyth, Ceredigion, SY23 3DB
ajt7@aber.ac.uk

October, 2012

1 Project Description

The National Plant Phenomics Centre (NPPC) is a newly developed research facility belonging to the Institute of Biological, Environmental, and Rural Sciences (IBERS), Aberystwyth University. Described by the University as the ”most advanced research greenhouse” in the UK [1], the facility is designed to achieve non-destructive phenotyping of plants through the use of automated processes; with every plant in the system being individually identifiable and able to be analysed using the equipment available including a battery of imaging devices that image the plants across different spectrums to allow for gene identification based on physical characteristics such as leaf density, water usage, and chlorophyll production.

In this course of this project, I shall seek to develop software that utilises the LemnaTec hardware to automatically image each plant, and process and analyse the resulting images. This will include the use of visual imaging, near infra-red, thermal infra-red, and fluorescence imaging. Although the facility will eventually include Laser imaging systems, it is understood that this won't be accessible for the majority of the period covering this project, and so will not be included in the work.

2 Work to be tackled

In attempting the development of a plant imaging, processing, and analysis system (PIPA), there are several issues to be addressed. Firstly, the system must be capable of interacting with other parts of the wider NPPC system, to take inputted images from the camera systems, and to then identify each plant in an image and match this to its assigned RFID before any phenomics-focused processing or analysis can begin. Secondly, and central to the entire system, PIPA must be able to identify plant characterics based on the presented images which shall be using a range of spectrums.

References

[1] BBC News, “Aberystwyth university phenomics centre to develop new plants and crops.” http://www.bbc.co.uk/news/uk-wales-mid-wales-18045351, May 2012.