CSIRO Curtin University Digital Agriculture Scholarships

PhD project list

Can machine learning and big data help predict the next enterprise jump and movement in commodity price?

Livestock prices have recently increased in Western Australia. Lupin prices are partially dependent on livestock prices, and if Lupins increase in price, they may re-enter the farming system. This project would evaluate the co-dependencies, lag effects and cross correlations between the livestock pricing signals, lupin pricing signals, climate and weather.

Deep learning and high resolution 3D imaging for land cover identification

Advances in sensors and computational power provide new opportunities for monitoring. If you are interested in exploring the possibilities of the latest tools and hardware including deep learning and GPU supercomputing then this is for you.

Crop biomass and pasture quality – Novel ways to assess quality

Crop quality and pasture quality influence the value of the commodity. Optical and Synthetic Aperture Radar (SAR) and ASD provide important information about the vigour and structure of plants. CSIRO have a library of information that new machine learning techniques could be applied to that would help predict when plants are at their optimal level of quality.

Data visualisation and animation of crop genetics and agronomy for Western Australia?

Did you know that crop varieties and crop species grow quite differently? CSIRO can generate output that demonstrates where and how advanced different crop species are. However, people interested in this information react to maps, moving animation and other visual cues better than point based graphs. Can you create a digital animation for WA about how crop cultivars relate to different climates and soils?

Twitter analytics for agriculture

Do you tweet? Twitter analytics provide a powerful insight into what is being discussed. Can you track what the agricultural industry is worried about at a point in time? You would evaluate the twitter universe for agriculture and comment on networks and connectivity.

Advanced analytics to forecast the world food supply by fusing models with remote sensing

Australia supplies 15% of the worlds traded grain, and provides a food buffer for much of the world when shortages occur. Better forecasting technologies are required to track Australian crop production and this project would contribute to some of the fundamental science behind crop forecasting. The project would:

- Develop an analytical approach using a combination of satellite imagery and crop models to predict crop yields

- Explore the sensitivities of the model to climate extremes and soil type

Sensing pathogens in food crops with multispectral imaging systems and mechanistic models

Pathogens such as septoria, stem rust, leaf rust and powdery mildew all cause significant damage to Australian cereal crops in the productive high rainfall zone. Identifying and monitoring these diseases is vitally important for farmers, grain traders and consultants. This project would:

- Identify whether sensors can detect crop pathogens in cereal crops
- Determine the impact crop pathogens have on crop production, using mathematical models of crop yield and information generation from the next generation of sensors.

Exploiting novel data streams and big data to manage spatially variable field crops

Crop yields often vary by 50% or more due various to landscape factors. Untangling the cause of this variation presents a challenging problem for a data scientist, who must integrate multiple streams of data from crop models, remote sensing satellites, drones, soil moisture probes and geophysical information. The project would:

- Integrate digital information sources to understand the spatial variation of crop yield
- Develop management strategies based on these new data models of crop yield

Integrating multiple data sources to predict the crop response to fertiliser

The crops response to fertiliser varies with season and soil type, which complicates the decision to apply fertiliser. Multiple data streams, from crop models, remote sensing, soil surveys, drones and soil moisture probes may be synthesised to develop the ultimate fertiliser decision aid for farmers that identifies when and where a crop will respond to applied fertiliser. The project would:

- Integrate digital information from multiple sources to determine how responsive the crop is to applied fertiliser.
- Develop management strategies based on these new data models of crop responsiveness to fertiliser.

Design your own project

You are invited to put forward a proposal for a research project of your own. For it to proceed to assessment for scholarship, the project will need to have the support of supervisors from Curtin University and CSIRO's Agriculture and Food and Data61 business units and be of a topic of interest to digital agriculture.