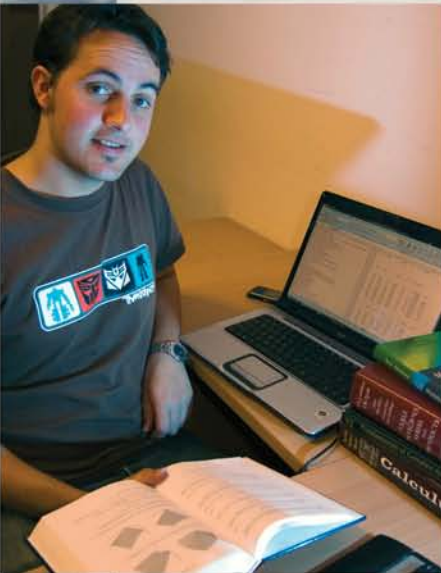


'We can use aggregation functions to recognise different 'textures' in the images, corresponding to urban landscapes, grass, bushland and so on.'

$$M_w(\mathbf{X}) = \sum_{i=1}^n w_i$$

ANALYSING TEXTURES: IMPROVING METHODS FOR PROCESSING SATELLITE IMAGES



Simon James is working on improvements to image processing and decision-support software.
Image: Josh Smyth

Deakin mathematicians are developing new ways to crunch data. Their work could transform the processing of satellite images and improve decision-support software.

PhD student Simon James is using aggregation functions to look at mathematical problems including decision-making, fuzzy logic and rule-based systems. They're a tool for combining and then simplifying sets of numbers.

"Aggregation functions give us an overall indication of a larger data set," says Simon.

"At its simplest, this could be the average value of a group of numbers. But aggregation functions can also be applied to a wide variety of real-life situations and systems."

The real-life applications Simon has investigated include texture recognition in image processing, recommendation systems used in finance, and even ranking the importance of academic journals.

One example is identifying land use in satellite images. Getting a useful and informative image from the raw data collected by the satellite

requires substantial processing. Simon and his supervisor Dr Gleb Beliakov have shown that aggregation functions can assist in identifying different features of the landscape.

"Comparisons of each pixel to its neighbours can provide information about the picture. For example, if bright colours are located right next to dark colours, that can indicate a rough texture," explains Simon.

These summaries are known as 'grey level co-occurrence matrices' (GLCMs) and can be used to predict image texture, which in turn can be used to define different regions of the image.

"We can use aggregation functions to interpret these matrices and recognise different 'textures' in the images, corresponding to urban landscapes, grass, bushland and so on."

"The same technique can be applied to other types of image processing, such as the analysis of medical images to identify suspected tumours," he says.

FURTHER INFORMATION:

School of Information Technology
Principal supervisor: Dr Gleb Beliakov
E: gleb.beliakov@deakin.edu.au
www.deakin.edu.au/scitech/it