

Compressed Sensing: the next “Big Idea” in Signal Processing

Presenter: Dr Garry Newsam
ISRD, DSTO

Venue: SA Water Lecture Theatre
Mawson Centre
Mawson Lakes Blvd
(Library Building)
Mawson Lakes SA

Date: 14 September 2007,
4:00pm–6:00pm

Abstract

Most signals are known a priori to be sparse in some representation: for instance images are known to have relatively few significantly nonzero components when represented as sums of wavelets. Nevertheless images are routinely recorded and processed as large inefficient 2D arrays of pixels, and are only subsequently compressed for storage or transmission. Consequently researchers and practitioners have long had the dream of “compressed sensing” systems (i.e. systems that collect and process only the data really needed to do a given job), but construction of such systems usually founders on the difficulty of designing sensors that directly sense the domain where the information is known to lie (e.g. the first few wavelets). Recently, however, Candes, Donoho, Tao and others have revolutionised this subject by proving that an object x of length N known to have only $K \ll N$ significantly non-zero entries can be reliably reconstructed from just $c \cdot K$ random projections of x where c is a small number. Since random projections in one representation remain random in any other representation, these results open up ways of using existing sensors for efficient data collection, and also more efficient data processing through manipulation of the random projections rather than the reconstructed object. The results have led to an explosion of theoretical and practical work in the last few years which is now surfacing in the form of plenary talks, special conference sessions, DARPA sponsored research programs, etc. The seminar will give an introduction to the subject, some insight into the underlying theory, and describe wide ranging applications such as new digitisation systems for ultra-wideband signals and a camera with just a single pixel that can output video imagery. For more information on this topic, see <http://www.dsp.ece.rice.edu/cs/>.

Presenter

Dr Garry Newsam has extensive experience with defence and civilian projects involving image exploitation, and has a research background in applied mathematics and image processing. His research interests include: statistical modeling of imagery; target detection; image segmentation and registration; and multi-resolution algorithms for analysis and interpolation of irregularly sampled data. He has also consulting experience in analyzing energy use data and in financial mathematics.

Bookings Essential

Please RSVP by no later than
7 September, 2007

Phone: (08) 8302 3928
Fax: (08) 8302 3115
Email: industryeducation@nicta.com.au

Format of the Seminar

16:00–17:00 Presentation
SA Water Lecture Theatre
(MC1-02)
17:00–18:00 Drinks and Refreshments
Exhibition Space
(MC1-14)