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SPAN's mission is to achieve excellence in the application of innovative spatial analysis in support of research, education and community outreach

Manager's Message	1
Software/Hardware	2
MADIS	2
Out and About	3
ARIA	3
S-PLUS	4
Projects	4

With 2004 drawing rapidly to a close and Christmas almost upon us, it is timely to wish everyone a very safe and happy holiday season. I would also like to acknowledge the skills and dedication of the SPAN staff and to thank them all for their professionalism and hard work throughout what has been a very busy and productive year.



MATLAB and Simulink scientific, engineering and simulation software have been installed on our Unix computer due to popular demand and a RAID array of hard disc storage has been added to increase storage capacity.

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SPAN is a research support unit within the Division of Research and Graduate Training at Charles Sturt University. It has offices at Thurgoona, Bathurst and Wagga Wagga campuses to provide postgraduate and staff research support in three main areas: remote sensing, Geographic Information Systems (GIS) and spatial statistics.

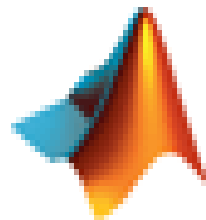
SPAN might be able to assist your research in ways you do not anticipate. From simple data retrieval and map making to complex spatial and statistical data analysis, SPAN is available to enhance the quality of your research. If you are a researcher, academic or postgraduate student at Charles Sturt University and believe that some aspect of your research might be assisted by using our skills, do not hesitate to contact your local SPAN representative.

Want to know more? Visit www.csu.edu.au/research/span

Software/Hardware

MATLAB and Simulink

A new software package has been installed on the University's central research Unix System Newton. MATLAB is a high-level technical computing language and interactive environment for algorithm development, data visualization, data analysis and numerical computation. The MATLAB language supports the vector and matrix operations that are fundamental to engineering and scientific problems.



With MATLAB, technical computing problems can be solved faster than with traditional programming languages because low-level administrative tasks, such as declaring variables, specifying data types and allocating memory, are not needed. In many cases, MATLAB eliminates the need for 'for' loops. As a result, one line of MATLAB code can often replace several lines of C or C++ code. At the same time, MATLAB provides all the features of a traditional programming language, including arithmetic operators, flow control, data structures, data types, object-oriented programming (OOP) and debugging features.

MATLAB can be used in a wide range of applications, including signal and image processing, communications, control design, test and measurement, financial modelling and analysis and computational biology. MATLAB code can be integrated with other languages and applications.

Simulink is a platform for multidomain simulation and model-based design of dynamic systems. It provides an interactive graphical environment and a customisable set of block libraries that allow accurate design, simulation, implementation and testing of control, signal processing, communications and other time-varying systems.

If you want to know more about MATLAB or Simulink check out <http://www.mathworks/products>. For access to this software, please contact Gary McKenzie on 02 6933 2165.

Addition to Newton

SPAN has installed a 16 disk SCSI To SATA RAID 6 array in Newton. Fourteen of the drives are for data, One is configured as a hot spare and the remaining drive is a pass through disk. The RAID 6 configuration protects users against up to two simultaneous disk failures and the first failed disk will automatically rebuild on the hot spare. The pass through disk will allow archiving from Newton to relatively inexpensive SATA drives.



This will add significantly to disk space for research users on Newton and for SPAN's spatial geodatabase.

MADIS

SPAN Takes to the Air

Charles Sturt University's Multispectral Airborne Digital Imaging System (MADIS) has been fitted to a Wagga Wagga-based helicopter. Wayne Connors, the Faculty of Science and Agriculture laboratory craftsman, designed and built an aluminium mount for MADIS that fits onto the Bell 47 helicopter skids. After gaining CASA approval for the equipment, Chris Cabot of the Wagga Air Centre piloted the first test flight recently over a local olive grove. The ability of the aircraft to hover at low altitudes and its manoeuvrability mean that much greater detail can be gained with more flexible flight paths. Ingrid Wootton is planning to assess the use of this technology in forecasting yield as part of her PhD research.



Above: MADIS installed

Below: SPAN Manager Gail Fuller carries out a few final checks and adjustments to MADIS before takeoff in the helicopter



Out and About

SPAN Visits Orange Campus

On Monday 30 November SPAN's Manager, Gail Fuller, and Research Support Officer, Steven Gibbs, visited staff and postgraduate students at CSU's new Orange campus. The aim of the visit was to demonstrate SPAN's capabilities and inform Orange researchers that, as part of CSU, they would be entitled to access SPAN resources for their projects.



Gail presented a summary of SPAN's skills and software and hardware resources to approximately 15 researchers. If you are a CSU researcher based at Orange campus or elsewhere in CSU, and would like a presentation on SPAN, please contact Gail on 02 6933 2004.

SPAN Presents at GIS Workshop

Noted GIS author Paul Longley was special guest at a GIS Workshop convened by the Centre for Urban and Regional Studies at the University of Newcastle. Attendees to the workshop were invited to present on any GIS or spatial indicator topic of their choosing. SPAN attendee, Steven Gibbs, presented on the use of GIS in addressing issues in rural and remote education. His talk was based on his work on the Rural (Teacher) Education Project for the School of Teacher Education (see SPAN Newsletter September 2004). Other presentations included the spatial distribution of employment in Sydney, assessing rural transport supply and demand, using GIS to analyse settlement patterns in Roman Britain, assessing composite indices such as the UN Human Development Index and the challenges of developing a spatial allocation model to determine the optimal location of schools in Jordan. The program and abstracts from this workshop can be downloaded from <http://www.newcastle.edu.au/centre/curs/GISConference.html>.

Regional Passenger Trains Report Released

Ian Gray of the Centre for Rural Social Research released his report for the Local Government and Shires Associations of NSW on country rail services in October. SPAN assisted Associate Professor Ian Gray in two main ways: creating maps of NSW showing the railway network, service frequencies, rail stations and population; and accessing rail data from CountryLink on the number of people getting on and off XPT services at NSW rail stations. A PDF of his report can be downloaded from <http://www.csu.edu.au/research/crsr/>.



ARIA

What is ARIA?

ARIA stands for the Accessibility/Remoteness Index of Australia. It is a geographic measure of relative distance to services. It was developed by the GISCA at Adelaide University.

How is it calculated?

Five categories of urban centre were created based on their population:

- Category A: >250,000;
- Category B: 48,000-250,000;
- Category C: 18,000-48,000;
- Category D: 5,000-18,000; and
- Category E: 1,000-5,000.

Every space in Australia then has its road distance to each of these categories calculated. The size of the urban centre is used as a proxy for availability of services, with all services available in Category A and limited services available in Category E. A score of between 0 and 14 is created based on these distances, with 0 most accessible and 14 most remote. These scores are allocated to five classes of accessibility/remoteness: Major Cities, Inner Regional, Outer Regional, Remote and Very Remote.

How can I access ARIA?

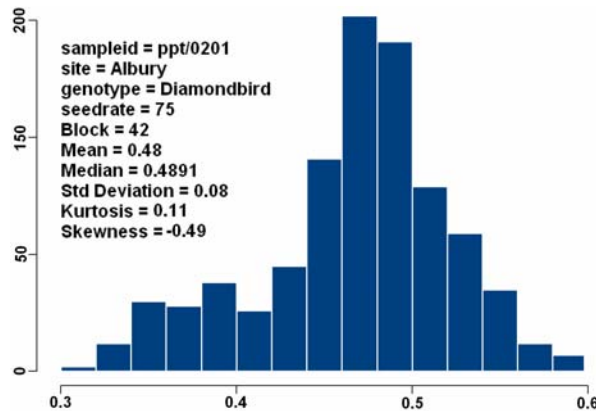
ABS has incorporated ARIA into its Australian Standard Geographic Classification (AGSC). SPAN can access the ARIA scores for various AGSC levels, such as postal areas and statistical local areas. ABS's National Regional Profiles contain the percentage of the population for various geographic areas for each remoteness class. ARIA scores can also be obtained from the GISCA website. Contact SPAN for more information on ARIA.

S-PLUS

S-Plus in Action

The amount of flour extractable from wheat depends on grain size and its distribution. A study by Erwin Tanaja, PhD student in the School of Agricultural and Veterinary Science, looks at morphological characteristics of wheat (grain length, width and area). SPAN was requested help Erwin by providing access to SPAN's central research computer system 'Newton' for processing of over 400,000 wheat grain images and providing support in the use of S-Plus.

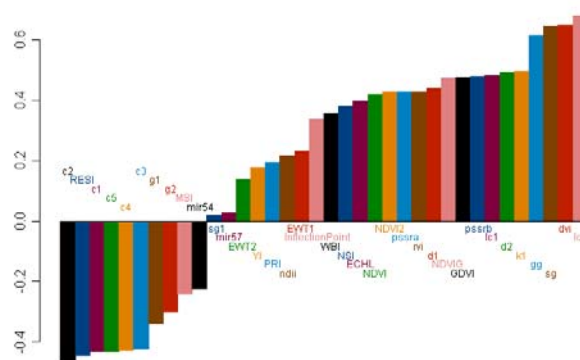
SPAN's Simon McDonald wrote an S-Plus script for Erwin that automatically produced over 1000 histograms with specific file names made of concatenated information for sorting purposes. On each of the histograms the values of skew, kurtosis, median, mean, plot and other statistics were recorded so the researcher could quickly identify where the data had been extracted from and what the descriptive values of the distribution were. The descriptive statistics were exported automatically as an Excel spreadsheet for the researcher to review. This illustrates the flexibility of S-Plus and SPAN's use of S-Plus for research purposes.



S-Plus Add-In

The latest version of the S-Plus add-in for automated analysis of remotely sensed data has been produced. This extension of S-Plus reads in binary (with translator) or ASCII remotely sensed data and allows you to find the average spectra. It will allow the user to explore for or calculate spectral indicators and compare them to physical data or other indicators. It will then complete an automated stepwise linear regression that can regress in both directions and it will cut out correlated variables above a user tolerance to remove any multicollinearity issues. If you would like a copy of the latest tools, email Simon at smcdonald@csu.edu.au.

Correlation of indicators with Water Potential



Projects

Antechinus

Researcher: Matthew Herring

Matthew suspected that Antechinus tend to live in areas where there is plenty of vegetation cover. SPAN was called on to help assess this hypothesis. Firstly a vegetation layer was sourced from the former DLWC. Next, specific study sites were chosen that definitely did or did not contain Antechinus. The study sites were then buffered to one and two kilometres. The vegetation cover for each area was calculated and statistically compared. So do Antechinus need vegetation cover in their habitat? Find out in a future SPAN newsletter.



Security Services Review

Division of Facilities Management

SPAN is assisting the Division of Facilities Management undertake a survey of the attitudes of CSU staff and students towards CSU's Security Services. Over 350 of 1300 randomly selected staff and students completed the on-line survey. The survey asked about the perceived role of Security, staff and students' experiences with Security, overall satisfaction with Security and an assessment of personal safety at various locations on campus at different times of the day. The draft report on the data analysis will be presented to the Division prior to Christmas.