

The Australian Urban Research Platform

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Summary

The Australian Urban Research Infrastructure Network (AURIN – www.aurin.org.au) project has been funded to provide a common platform through which a range of urban phenomena and research challenges can be tackled. These areas (lenses) cover population and demographic futures/benchmarked social indicators; economic activity/urban labour markets; urban health, wellbeing and quality of life; urban housing; urban transport; energy and water supply and consumption, and innovative urban design. This paper describes the AURIN infrastructure and illustrates how it is tackling many of these lens and inter-lens challenges utilizing a broad spectrum of “distributed” and completely heterogeneous data from a range of agencies across Australia (including federal/State government departments, industry and academia). Furthermore, the AURIN platform now provides an extensive range of tools and capabilities covering both advanced (targeted) tools as well as more generic analytical and visualization capabilities. These tools and data sets can be enacted as stand alone instances as well as through an advanced workflow enabled environment utilizing Cloud-based resources. All of these capabilities will be presented.

Introduction

A multitude of organisations hold data of relevance and importance to urban research. The AURIN project has been tasked with unlocking many of these data sets – in particular focusing on those data sets that help to shape the understanding of living in urban environments. Whilst each “silo” of data can potentially be unlocked individually, the AURIN project aims to provide an integrated platform offering single sign-on capabilities, i.e. log in once and access a range of distributed data from *autonomous* data providers without further security challenge/responses. To this end the project utilises the Australian Access Federation (AAF) for federated authentication with on-going support for finer grained authorisation, and has developed a range of remote data access clients that allow seamless, secure access to data from remote, autonomous providers. To focus the work of AURIN, a range of data and tools from a range of data providers with associated scenarios has been identified that are shaping the AURIN urban research efforts – selected by expert committees comprising leading urban/population researchers and associated data providers/stakeholders. This includes access to and use of data sets from a range of organisations including the Australian Bureau of Statistics (ABS – www.abs.gov.au); national health data sets and surveys from organisations such as the Population Health Information Development Unit (PHIDU – www.publichealth.gov.au), through to State wide data sets from organisations like the Department of Health in Victoria (www.health.vic.gov.au) and in Western Australia (www.health.wa.gov.au). At present close to 300 nationally significant data sets are available through AURIN with this number expanding rapidly.

It is important to note that the AURIN platform is far broader than these specific lenses and the tools that are currently provisioned. It is quite possible for researchers to come along with their own data and upload/analyse this with other AURIN data sets and tools available through the AURIN platform, and subsequently download the results. The AURIN systems have also been defined to be extensible and cater for a variety of data sets and scenarios. Key to this is data and metadata management. The project has established a platform where metadata can be automatically harvested and indexed with user interfaces that allow for refinements of metadata information to be incorporated.

Description

To illustrate how the AURIN platform supports urban research challenges, we outline a typical research use case linking individual level survey data, e.g. questionnaires, with other data to

derive particular health measures. In 2012, the Victorian Department of Health completed a major survey on the health and lifestyle of Victorian residents. This included responses from over 25,000 individuals on a range of questions concerning their health and wellbeing and factors that can influence this, e.g. smoking, alcohol consumption. Access to such *individual* responses is restricted and subject to strict information governance constraints. These data sets give a representative, statistically relevant snapshot of the Victoria population and cover measures such as “Subjective Wellbeing” and “Work-Life Balance”. Complementing these surveys are data from the ABS and PHIDU. The ABS Census gives the most detailed information available for the Australian population covering a variety of aspects of population demographics and living, working in Australia more generally. PHIDU hold a rich collection of data covering births, deaths, health, e.g. cancer screening. At present PHIDU make available over 150 major data sets covering a variety of health related issues across Australia to AURIN.

Figure 1 shows how for the Statistical Division of Melbourne, a range of data from VicHealth has been visualized and analysed with data from PHIDU. Specifically Figure 1 shows spread of individuals over the age of 18 with Type 2 diabetes (taken from PHIDU) in particular statistical local areas (SLAs) of Melbourne from a 2007-2008 survey, and their relationship with indicators from VicHealth related to “*sedentary behaviour*”. Also shown is data from the University of Newcastle (Centre of Full Employment and Equity (CofFEE)) related to the population profile of those SLAs. The scatter plot shows how these data sets have been joined and the relationship between type-2 diabetes and sedentary behavior for the particular SLAs. All of these data sets and tools are interactive.

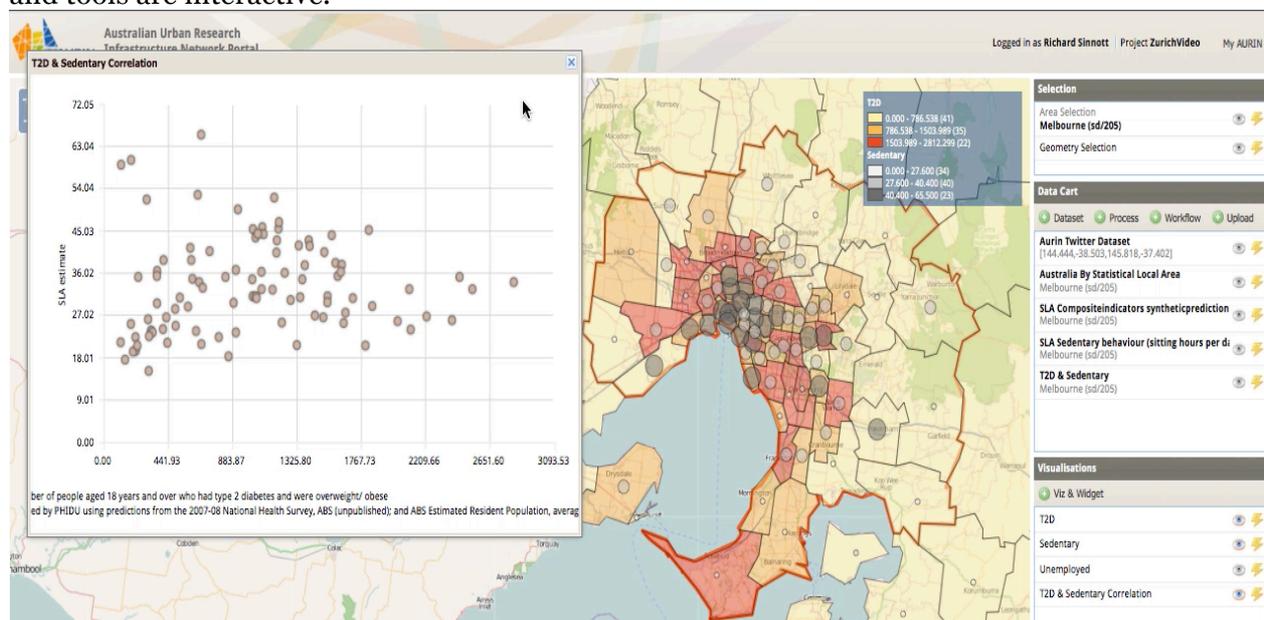


Figure 1: Correlation between Type-2 Diabetes (PHIDU), Sedentary Behaviour (VicHealth) and the Population Profile for the SLAs within the Statistical Division of Melbourne (CofFEE)

An increasing focus of urban research is also on incorporation of social media data. Harvesting and use of Twitter data is already supported with tools that allow tracking of the location and movement of tweeters and for example, the languages that they tweet in. Such information provides a different, real time perspective of information from providers like the ABS, VicHealth and PHIDU.

Conclusion

The AURIN project is developing an extensible e-Infrastructure through which urban research can be supported. The systems are currently being used for a range of urban research endeavours where access to distributed and heterogeneous data with advanced security systems is mandatory. The work has already demonstrated a variety of capabilities that are directly shaping many national initiatives across Australia.

References

R. Stimson, M. Tomko, R.O. Sinnott, The Australian Urban Research Infrastructure Network (AURIN) Initiative: A Platform Offering Data and Tools for Urban and Built Environment Researchers across Australia, State of Australian Cities, Melbourne, Australia, November 2011.

R.O. Sinnott, G. Galang, M. Tomko, R. Stimson, *Towards an e-Infrastructure for Urban Research Across Australia*, IEEE e-Science Conference, Stockholm, Sweden, December 2011.

R.O. Sinnott, C. Bayliss, G. Galang, P. Greenwood, G. Koetsier, D. Mannix, L. Morandini, M. Nino-Ruiz, C. Pettit, M. Tomko, M. Sarwar, R. Stimson, W. Voorsluys, I. Widjaja, *A Data-driven Urban Research Environment for Australia*, IEEE e-Science Conference, Chicago USA, October 2012.

M. Tomko, C. Bayliss, G. Galang, P. Greenwood, G. Koetsier, D. Mannix, L. Morandini, M. Nino-Ruiz, C. Pettit, M. Sarwar, R. Stimson, R.O. Sinnott, W. Voorsluys, I. Widjaja, *The Design of a Flexible Web-based Analytical Platform for Urban Research – Systems Paper*, ACM International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS 2012), Redondo Beach, USA, November 2012.