ANDS Guide

Geospatial

Level: Awareness

Last updated: July 2017

Web link: www.ands.org.au/guides/geospatial

This Guide sets out to explain the basic concepts behind this term, which is a relatively new one in the language. If you think of maps, you are already thinking geospatial, which is sometimes also written as geo-spatial.

What does Geospatial mean?

Geo loosely means 'the Earth', as in geography or geochemistry. Spatial refers to 'in space', meaning anything that can be represented in terms of position, coordinates etc. These days geospatial is also used to refer to the kinds of analyses you can do with the aid of computers and software-the combination of computer and software is called a Geographic Information Systems (GIS). If you have a Smartphone, you probably already have a basic geospatial engine, something that can show you where you are and how to get to somewhere else!

Early Examples of Geospatial Data

Some of the early maps might have shown the location of water on the land and in the case of ancient mariners, the location of land in the water. Humans have been creating maps for a very long time. As populations grew, the 'edges of the map' so to speak, have been filled in, another classic geospatial concept. We now know a great deal about the surface of the earth and the water (oceans, seas, lakes etc.) and well as what's below them. Historically, these pictures have been built up by observation, experience and even stories. The term 'built up' is appropriate

here, as each successive 'geospatial' researcher would always try to build upon what was available. After all, there were limited opportunities to sail around the world in 1850!

Modern Geospatial Data

The advent of remote sensing (e.g. imagery and other forms of data from planes, satellites etc.) and Global Positioning Systems, along with powerful computers and software, has enabled some fundamental advances to be made in this field. These days the term 'geospatial' often refers to all of these technologies used together. A simple example: you 'drop a pin' on the Google Maps application to show your current location, normally recorded in decimal degrees latitude and longitude. You then take a photograph of something and connect that photograph to the pin. Your photo is now geo-located, in other words, it's now a piece of geospatial data.

That photograph can be shown on a 'flat map', like the maps in a car GPS or a traditional street map for that matter, or on a three-dimensional map, where elevation is the third dimension. Once in 3D, there are virtually unlimited things you can do. For example, if you want to map the snowline in the Australian Alps-a very difficult job to do just a few decades ago-you would only have to obtain a freely-available electronic base map which will show the land, rivers, mountains and so on-a basic GIS and some images from space. But what happens if these images are spoiled by cloud? No problems at all; we can use all kinds of electro-magnetic imaging, including a hybrid radar, to show where the snow line is, and the important thing these days is that the images can be made to fit the base map precisely (a process called geo-rectification).

The examples so far have been from the physical sciences, which is where the geospatial field originated. However, the technologies have now been applied to a wide range of fields including the humanities, health and economics. For example, you could overlay a map of health indicators with another map showing income or age distribution and then perform all sorts of analyses within and between the map layers. The resulting product could be a location 'disadvantage' map.

Geospatial Metadata and Data Management

Geospatial data models are well developed, as are their metadata models. Standard features include aspects like coordinate systems, projection, datum etc. and there are several open access standards which are widely used.

In terms of data management, geospatial data tends to require large storage volumes and fast processors, and this is especially the case for remotely sensed data.

The Real Advantage of Adding Geospatial Attributes to Data

Take a look at the Atlas of Living Australia (ALA) or Research Data Australia as examples; in both, there is a geospatial dimension. If you are interested in the distribution of a particular species, in ALA you 'see' where occurrences are, you can see what's happening in your own suburb or region, or compare regions. Similarly, you can use its geospatial capabilities to extend this to multiple species and regions.

In Research Data Australia, there are many records, which have a 'bounding box', a geospatial concept which basically shows the region in which the record sits; this bounding box can literally become a window into any other study/collection in the same region. Whether using the bounding box alone or, in association with the

Connections and Suggested Links tabs, it is now possible in some cases to perform 'analyses-upon-analyses' or meta-research.

This geospatial area search in Research Data Australia returns data on barramundi, brown coral disease, coral mortality, meteorological and sea temperatures, sediment analysis, oyster survival in sub-tidal aquaculture, fish census, dredging, zooplanktons, river studies and more.

In other words, the power of a geospatial 'tag' lies in its ability to make connections to other research modes, types and even to seemingly unrelated things. That's exciting!

Further reading

- Geospatial data and metadata
- Open Geospatial Consortium

Feedback?

We welcome your feedback on this guide. Please email contact@ands.org.au with any comments or questions.

About ANDS

The Australian National Data Service (ANDS) makes Australia's research data assets more valuable for researchers, research institutions and the nation.

ANDS is a partnership led by Monash University in collaboration with the Australian National University (ANU) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). It is funded by the Australian Government through the National Collaborative Research Infrastructure Strategy (NCRIS).

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