Types of Data Sources

Objectives (Entry)

This unit will point out the available sources of data for Geographic Information Database.

Although the type of spatial and tabular data will vary greatly from project to project, the students will be aware of some of the most commonly available data sources at the end of the course.

Government agencies and commercial business collect and publish spatial and tabular data, which are used quite widely. Some of the government and commercial sources will be highlighted to the students for the immediate knowledge.

In the past, GIS exclusively rely upon paper map as the source of information. Present day, a great deal of spatial information is available in digital format through Internet web sites. The student will learn the importance of characteristics, cost, limitations and benefits of using different data sources.

GIS Data Sources (Clarification)

Introduction

Although the desired data can be generated using existing technologies, it is costly and time consuming. It would be cost effective and time efficient if the desired data is already existed and shared. It is worth to spend some times to browse the different data sources to find desired data at the acceptable data accuracy quality. The following discussions will point out various data sources for a GIS Project.

1. Web Pages

Internet is a source of GIS data in digital format. It is very important to evaluate the quality of data in Metadata (data about data) before downloading or purchase of data with respect to the data quality standard of GIS project.

2. Map Sheets

The hard copy maps are source documents for GIS data capture. These maps vary widely in term of content, media, format, scale, age, complexity and usage. The maps must be legibility and provide direct measurement capability for some applications.

The commonly produced map sizes are as follow.

ISO Paper size	mm
A0	841 * 1189
A1	594 * 841
A2	420 * 594
A3	297 * 420
A4	210 * 297

The actual map area within the sheet depends on the size, shape and orientation of cartographic elements on the map sheet. Each separate map sheet or quadrangle is intended to stand alone as a single entity. Therefore, edge matching between map sheets can be a major problem when combine the different sheets in the digital environment.

The edge-matching problem arises due to difference in map units, date of publication, scales and projections on the two maps.

3. Global Positioning System

GPS has the capability to collect the X, Y coordinates, Elevation (Z) and Attributes of spatial objects, point, line and polygons data. Moreover, GPS also provides precise time and velocity. Depending on the type of GPS and method of data collection, the spatial accuracy may achieve 100 meters to 1 millimetre.

Low-cost, single-receiver with Standard Positioning Service (SPS) may achieve 100-meter accuracy.

Medium-cost, differential SPS code Positioning may achieve 1-10 meter accuracy.

High-cost, single-receiver with Precise Positioning Service (PPS) may achieve 20-meter accuracy.

High-cost, differential carrier phase surveys may receive 1mm to 1cm accuracy.

As GPS is measuring the position and attributes, the GPS data is one of the sources to GIS.

As the GPS technology discussion will be included in Intermediate level, refer to the Trimble web site to introduce GPS technology to you.

Learn how GPS works at Trimble website.

4. Remote Sensing Data

Remote Sensing data is always processed and stored in raster data structures. When working simultaneously with an image processing system and a raster GIS, it is usually easy to move data between the two. Once the remote sensing data has been converted to a desired data type, transferring this data to a raster GIS is relatively easy. Most operational image processing and raster GIS systems provide mechanisms to read and write 8-bit-per pixel raster arrays. However, precise georeferencing and meaningful thematic extraction are critical.

More work is involved when transferring raster data derived from image processing system to a vector GIS. Continuous data such as vegetation abundance, involves extracting the contours of abundance (often call Isolines), the vectors are passed to the GIS, along with labels to indicate values associated with the contour lines or Isolines.

When working with discrete data such as landuse derived from image processing techniques, the pixels that form the boundaries of the areas are detected in order to isolate the implicit homogeneous polygons in the derived image. Then the boundary pixels are used to develop the vectors surrounding the areas and attributes value and class names are assigned to the bounded areas. The analyst will often smooth the stair steps boundary between classes of spatial objects to make the vector plots appear more realistic. One should remember that the underlying data might have been irreversibly changed. It is important to understand that the conversion processes are limited by the underlying data, in terms of precision and accuracy.

As the Remote Sensing Module will be included in the Intermediate level, the excellent sites from ASPRS is referred for further information on Remote Sensing Education in the following link.

The Remote Sensing Core Curriculum at ASPRS (American Society of Photogrammetry and Remote Sensing)

5. Surveying Data Sources

Refer to the Field Based Methods Unit of Primary Sources Lesson concerning with surveying data sources.

View the Data Sources (Look)

1. Manual of Federal Geographic Data Product (http://www.fgdc.gov/FGDP/title.html)

2. Federal Office of Topography, Switzerland (http://www.swisstopo.ch/en/INDEX.htm)

3. Federal Office of Topography, Switzerland (http://www.swisstopo.ch/en/INDEX.htm)
4. Swiss Federal Statistical Office (http://www.statistik.admin.ch/eindex.htm)
5. Swiss Organization for Geographic Information (http://www.sogi.ch/)
6. COGIS (http://www.cosig.ch/home_e.htm)
7. National Point of Contact for Satellite Images (Switzerland) (http://www.swisstopo.ch/en/image/npoc/INDEX.htm)
8. United States Geological Survey (USGS) (http://www.usgs.gov/)
9. NASA (http://www.gsfc.nasa.gov/)
10. U.S Department of Agriculture Natural Resources Conservation Services Data Clearinghouse (http://www.ncg.nrcs.usda.gov/nsdi_node.html)
11. Geography Network (http://www.geographynetwork.com/)
12. Internet GIS Information Sites (http://www.hdm.com/)
13. National Cartography and Geospatial Center (http://www.ftw.nrcs.usda.gov/ncg/ncg.html)
14. National Oceanographic Data Center (http://www.nodc.noaa.gov/)
15. National Oceanic and Atmospheric Administration (http://www.noaa.gov/)
16. Geographic Data Technology (GDT) Inc. (http://www.geographic.com/home/index.cfm)
17. UMBC-NSDI Data Clearinghouse (http://baltimore.umbc.edu/mdnsdi/data.html)
18. Satellite Imagery Available through the Internet from ASPRS (http://umbc7.umbc.edu/~tbenja1/freedata.html)
19. World Conservation Monitoring Center (http://www.unep-wcmc.org/)
20. Global Land Cover Map from AVHRR (http://www.geog.umd.edu/landcover/1d-map.html)
21. Global Land Cover Facility (http://glcf.umiacs.umd.edu/)

22. Surface Temperature Analyses (http://www.giss.nasa.gov/data/update/gistemp/)

23. Global Surface Temperature (http://lwf.ncdc.noaa.gov/oa/climate/research/blended/blended.html)

24. FAO Forest Resources Assessment (http://www.fao.org/forestry/fo/fra/index.jsp)

25. Global Land Biosphere Data and Resources (http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/LAND_BIO/GLBDST_main.html)

26. Vegetation Map library (http://www.lib.berkeley.edu/EART/vegmaps.html)

27. National Climate Data Center (http://lwf.ncdc.noaa.gov/oa/ncdc.html)

28. World Data Center for Meteorology (http://lwf.ncdc.noaa.gov/oa/wmo/wdcamet.html)

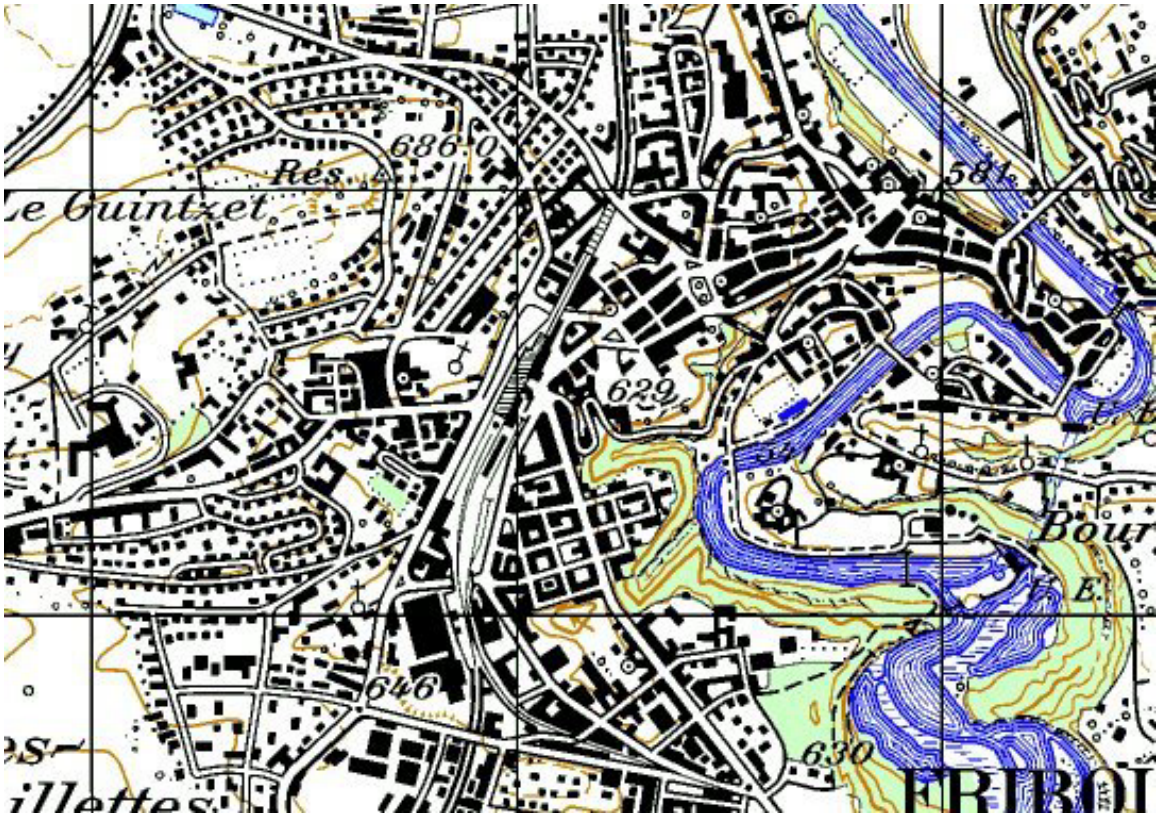
29. Land Process Distributed Active Archive Center (http://edcdaac.usgs.gov/dataproducts.html)

30. Topographic Map of the World (http://www.omnimap.com/)

31. Find out the Digital Chart of the World at GIS Data Depot in Geocommunity WebPages (http://data.geocomm.com/)

32. Street level detail digital data is available from Tele Atlas.(http://www.teleatlas.com/)

28. See the following paper map as an example of data source.



6. Data Research (Act)

1. Assuming that we want to analyse the impact of climate change to biodiversity at the global scale. According to the discussion, the following data sets are generally identified.

1. Elevation data or Digital Elevation Data of the World
2. Vegetation Map of the World
3. Global Mean Annual Temperature
4. Global Mean Annual Rainfall
5. Global Land Cover Map
6. Existing Protected Area of the World
7. Global Sea level Data

Suggest the available data sources for at least two data set mentioned above.

2. Find out the scale of TPC (Tactical Pilotage Chart), ONC (Operational Navigation Chart), JNC (Jet Navigation Chart), and GNC (Global Navigation & Planning Chart) Charts for the World.

(Hint. Check the www.omnimap.com)

3. A telecommunication company required very detailed street level data set to map the address of customers and to preliminary laid out the fibre optics network. Which dataset should be used?

7. Share your findings (Share)

Submit your finding from data research to the discussion group be email in order to share among the eClass.

8. Questions (self assessment)

Write down the different sources of data.