

GEOGRAPHICAL INFORMATION SYSTEMS

GIS Data Sources and Data Processing (Part 1)

by

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CHAPTER OUTCOMES

- By the end of this chapter, students should be able to:
 - ✓ Have the ideas of the possible data sources in GIS
 - ✓ Explain the important characteristics of GIS data (coordinates, projections, scale etc)
 - ✓ Discuss the steps of data processing based on certain data conditions in GIS projects

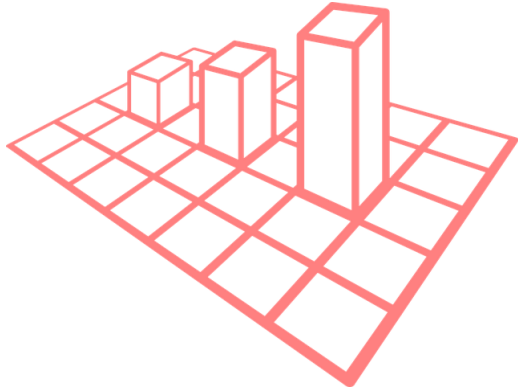
CONTENTS

- GIS data sources and characteristics
 - ✓ Available sources
 - ✓ Scale
 - ✓ Map Projections
- GIS data processing
 - ✓ Data collection
 - ✓ Data pre-processing
 - ✓ Data editing and quality assurance
 - ✓ Data input techniques

Available Data Sources

- Maps (hardcopy or softcopy) – thematic map, topographic map, cadastral map, etc.
- Satellite imageries
- *In situ* data collection
- GPS
- Surveys
- Questionnaires
- Census data
- Journal/published articles

Available Data Sources .. (cont'd)



Source of pictures: <https://pixabay.com>




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Communitising Technology

Important Elements on Data Sources

- There are a few elements that you need to know regarding GIS data
 - ✓ Scale
 - ✓ Coordinate Systems
 - ✓ Time/Date the data was collected
 - ✓ Quality

Scale

- Every hardcopy map has its own scale
- Scale of digital map or any data sources (in vector format) can be adjusted by zooming (in or out)
- Types of scale
 - Verbal – 1 cm represents 10000 km
 - Ratio - 1:10000, 1:100000
 - Graphical 
- Size of scale
 - Large (1:1000) – more details
 - Small (1:100000) – less details

Coordinates

- Every spatial data has coordinates
- Coordinates depend on what type of Coordinate System used for the data
- For more revision about Coordinate System, please refer to Chapter 2 (Spatial Data Model).

Time/Date of data

- Some data only valid in certain range of time
- When data is too old, the data source sometimes is not useful anymore, because so many changes have happened.
- Every hardcopy map has production date, every satellite imageries also have observation date.
- When building a GIS system, look for the data that is still relevant according to what system you are building.

Data Quality

- Data quality can be measured by the scale, resolution, date.
- Small scale data is suitable for system that does need details, large scale data is suitable for system that needs details.
- Higher resolution data is better than low resolution, however is more expensive
- Latest data is more valuable than older data, however sometimes is more expensive and not always available.

GIS Data Processing

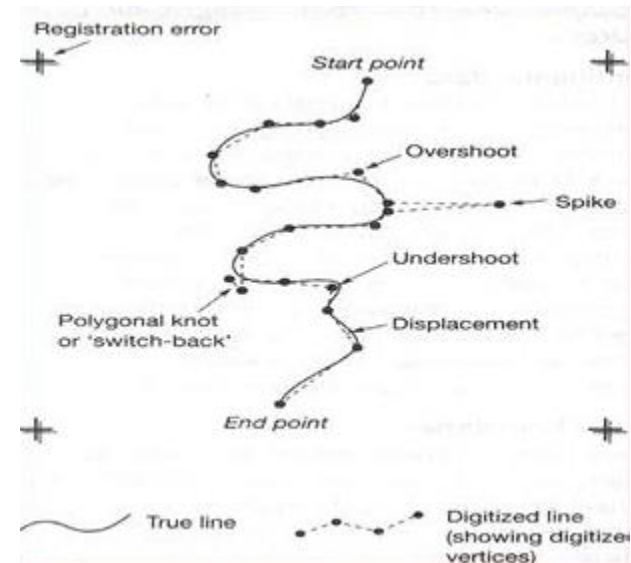
- After data collection (from the available sources), there are two important steps in preparing GIS data:
 - ✓ Data Input
 - ✓ Data editing and quality assurance

Data Input

- Some of data input techniques:
 - ✓ Manual digitizing;
 - ✓ Automatic scanning (or data conversion);
 - ✓ Coordinates entry;
 - ✓ Inputting existing digital data (through conversions)

Data Input ..(cont'd)

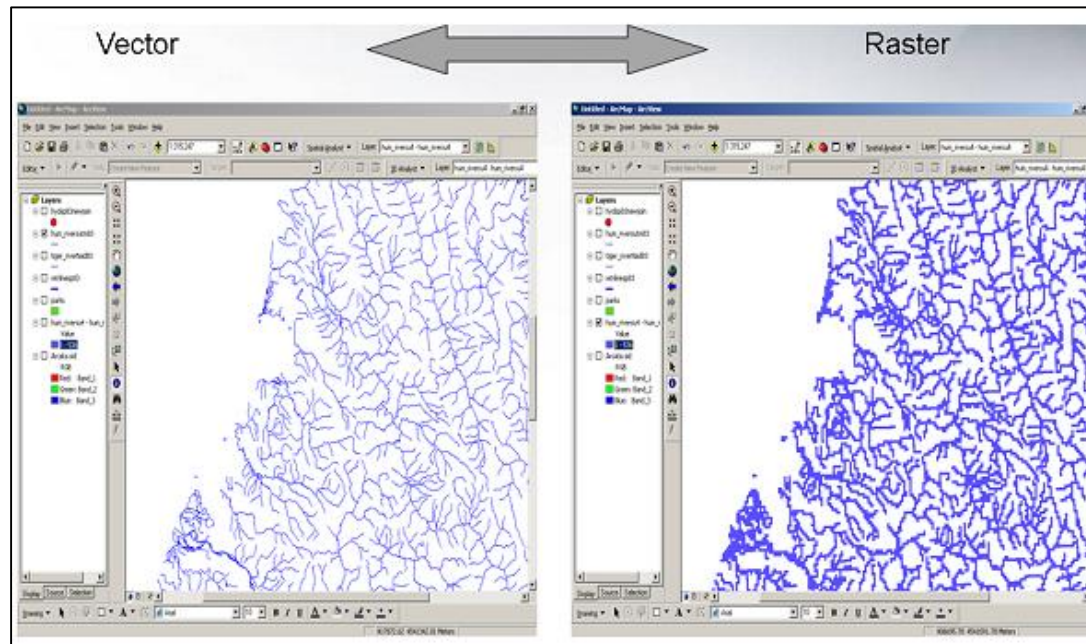
- Manual digitizing
 - Not commonly used anymore
 - Tedious and takes long time
 - Prone to errors



Source of pictures: <https://sites.google.com/a/vashuda.com/www/fundamental-of-gis/digitization-of-maps>

Data Input ..(cont'd)

- Raster to vector conversion (or vice versa)
 - Converted data needs to be checked first before being used
 - Example of raster: satellite images, maps, etc



Source of picture: http://gsp.humboldt.edu/olm_2015/Lessons/GIS/08%20Rasters/RasterToVector.html

Data Input ..(cont'd)

- Coordinates entry
 - Differ from software to software

Coordinate input using
ArcGIS software



Add XY Data

A table containing X and Y coordinate data can be added to the map as a layer

Choose a table from the map or browse for another table:

Specify the fields for the X, Y and Z coordinates:

X Field: [Dropdown]

Y Field: [Dropdown]

Z Field: [Dropdown]

Coordinate System of Input Coordinates

Description:
Unknown Coordinate System

Show Details Edt...

Warn me if the resulting layer will have restricted functionality

[About adding XY data](#) OK Cancel

Data Input ..(cont'd)

- Conversion of existing digital data
 - there are many formats of digital data
 - Examples: *.TAB, *.DXF, *.DWG, *.SHP etc..
 - These formats can be converted depends on needs.

Data quality assurance will be discussed in
Chapter 3 Part 2.



Think GIS way...

**If you have an old
hardcopy topographic
map, can you use it for
your GIS system? If
yes, what are the
processes? If no, why?**

