Classification of Non-Spatial Data Types in GIS

Geographic Information Systems (GIS) handle both spatial and non-spatial data. As spatial data outlines the location and shape of geographical features, non-spatial data (attribute data) contains other information about the features. It is essential to understand non-spatial data types to efficiently manage, analyze, and visualize data in GIS.

In this blog, we will discuss the various classes of non-spatial data types and their importance in GIS applications.

Lets delve into Non-Spatial Data —
Non-spatial data, or attribute data, defines the properties of geographic features but lacks information regarding location. For instance:

✦*The population size of a city (numeric attribute).*

✦*The name of a river (text attribute).*

✦*The land use category of a parcel (categorical attribute).*

This information is usually saved in tables associated with spatial objects (e.g., the attribute table of a shapefile or a geodatabase).
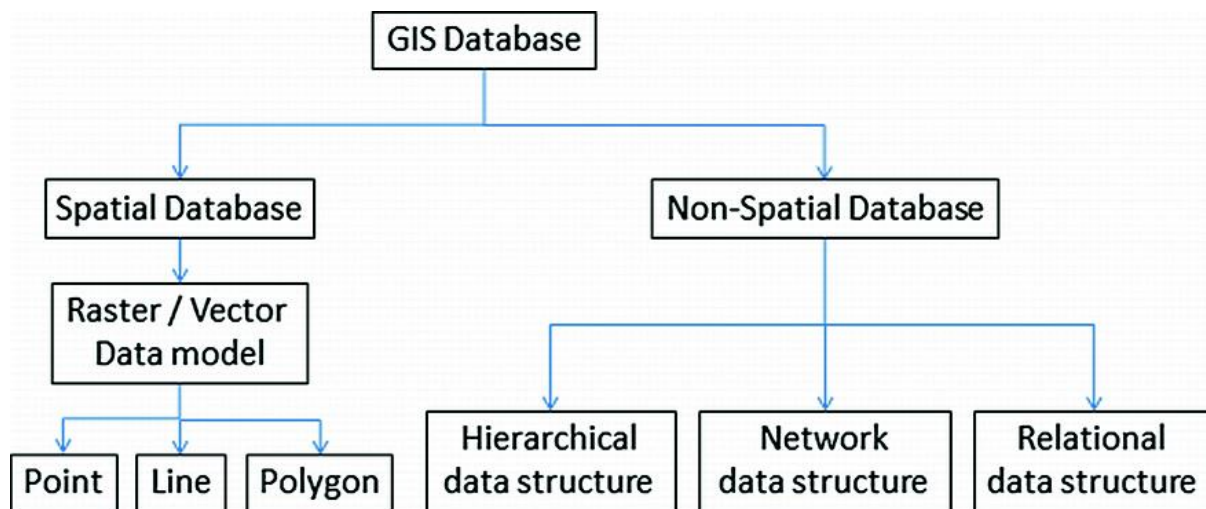
Types of Non-Spatial Data Types —

Non-spatial data may be broadly classified into various types depending on their nature and measurement scales:

A. Qualitative (Categorical) Data
This type of data is used to represent categories or labels and is not numerically measurable. It can be subdivided into:

→**Nominal Data** — Describes categories with no inherent order.

Example:

- Soil erosion levels (Low, Medium, High)

- Customer satisfaction ratings (Poor, Fair, Good, Excellent)

B. Quantitative (Numerical) Data
This type of data consists of measurable numerical values which further include:

→**Discrete Data —** Expresses whole numbers (countable).

Example:

- Number of homes within a neighborhood

- Number of traffic accidents within a junction

→**Continuous Data —** Expresses values which can be any value in an interval.

Example:

- Temperature readings (°C or °F)

- Elevation readings (meters or feet)

C. Text (String) Data
Consists of alphanumeric characters. Used to represent descriptive data.

Example:

- Street names

- Owner names in a real estate database

D. Date & Time Data
Captures date and time data. Useful in monitoring changes over time.

Example:

- Date when satellite was taken.

- Time of traffic accident.

E. Binary & Boolean Data
Binary Data: Stores yes/no or true/false values.

Boolean Data: Stores logical values (0/1, True/False).

Example:

- "HasPublicTransport" (Yes/No)

- "IsFloodProne" (True/False)

Best Practices for Managing Non-Spatial Data in GIS

✓ Use Consistent Naming Conventions (e.g., pop_2024 instead of population data).

✓ Normalize Data (avoid redundancy, e.g., storing country names repeatedly).

✔ Apply Proper Data Types (e.g., store ZIP codes as text, not numbers).

✔ Document Metadata (describe sources, units, and accuracy).

Importance of Non-Spatial Data in GIS

Strengthening Analysis: Enabling statistical and thematic analysis (e.g., population density, land use patterns).

Assists Decision-Making: Aids urban planning, disaster planning, and business intelligence.

Enables Better Visualization: Enables better map symbology (color-coding according to attributes).

Supports Querying: Enables users to select and show data (e.g., "Show all hospitals with more than 100 beds").
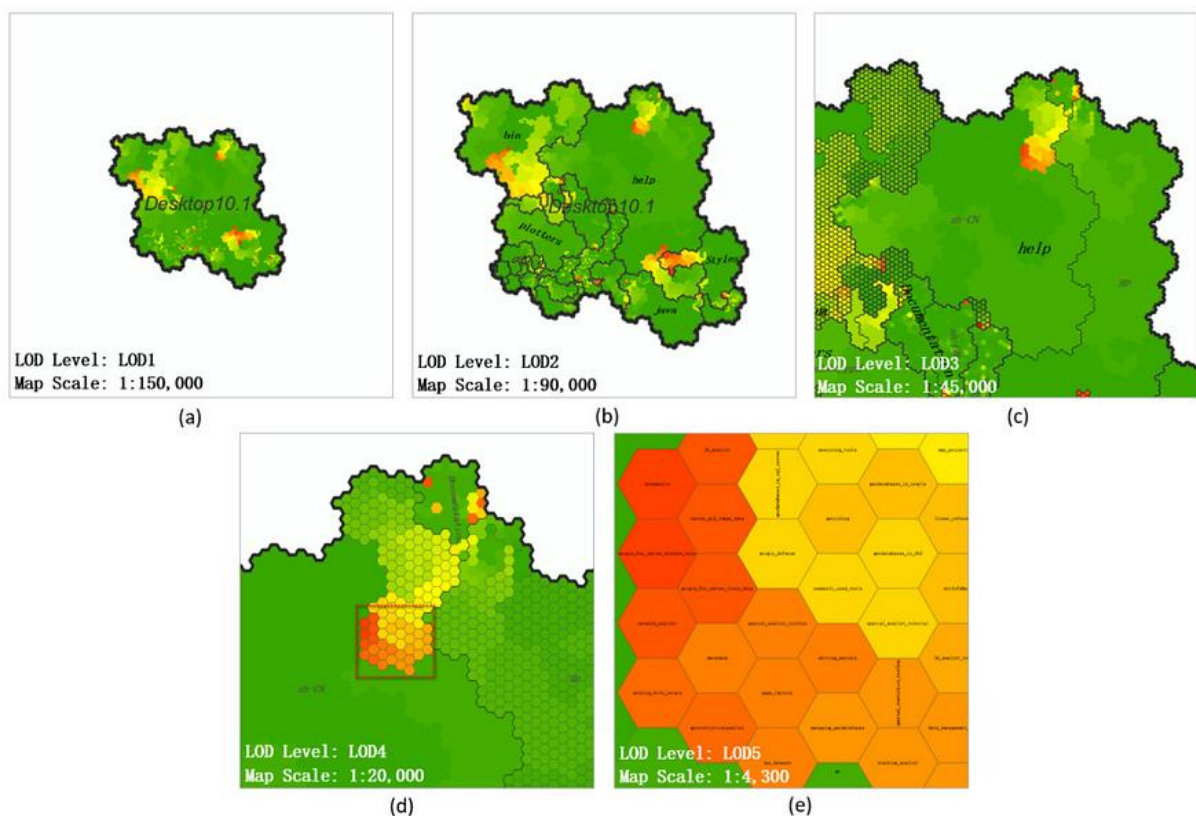
[2]Metaphor representation and analysis

Conclusion

Non-spatial data underpins GIS since it provides meaning to spatial attributes. Data classification into qualitative, quantitative, text, date/time, and binary facilitates GIS experts in upholding the efficient management, analysis, and visualization of geographic data. Awareness of these data types enables good data modeling and more effective geospatial analysis.

Images from —

[1] https://cdn.safe.com/wp-content/uploads/2021/10/14163948/Non-Spatial-Data-.png

[2] https://pub.mdpi-res.com/ijgi/ijgi-07-00225/article_deploy/html/images/ijgi-07-00225-g015.png?1570202991

Online resources/References —

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