Raster and Vector data

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Raster Data:

Definition:

Raster data represents spatial information as a grid of cells, where each cell holds a value or represents a feature. It is commonly used to depict continuous phenomena, such as elevation, temperature, or satellite imagery.

Characteristics:

- Grid Structure: Organized in a regular grid format with rows and columns.
- Cell Values: Each cell contains a specific value, representing a measurable attribute or characteristic.
- Continuous Data: Suitable for representing continuous and spatially varying phenomena.
- Pixel-Based: Individual cells are called pixels, and each pixel has a specific location and value.

Examples:

- Elevation models (Digital Elevation Models - DEMs).
- Satellite imagery.
- Temperature or precipitation maps.
- Land cover classification maps.

Types:

- Single-Band Rasters: Represent a single attribute, such as grayscale satellite imagery.
- Multi-Band Raster: Include multiple bands representing different attributes, like RGB bands in a color image.

Advantages:

- Efficient for representing continuous surfaces.
- Well-suited for analysis of phenomena with a smooth spatial variation.
- Compatible with remote sensing data.

Disadvantages:

- Large file sizes, especially for high-resolution data.
- Not suitable for representing discrete features with well-defined boundaries.
- Limited ability to store complex vector geometries.

Vector Data:

Definition:

Vector data represents spatial information using points, lines, and polygons. It is used to model discrete features with well-defined boundaries and is highly suitable for representing complex geometries.

Characteristics:

- Geometric Entities: Composed of points, lines, and polygons.
- Topological Relationships: Maintains relationships between spatial features, such as adjacency and containment.
- Attributes: Each spatial entity has associated attributes stored in a tabular format.
- Suitable for Discrete Features: Ideal for representing features like roads, rivers, and administrative boundaries.

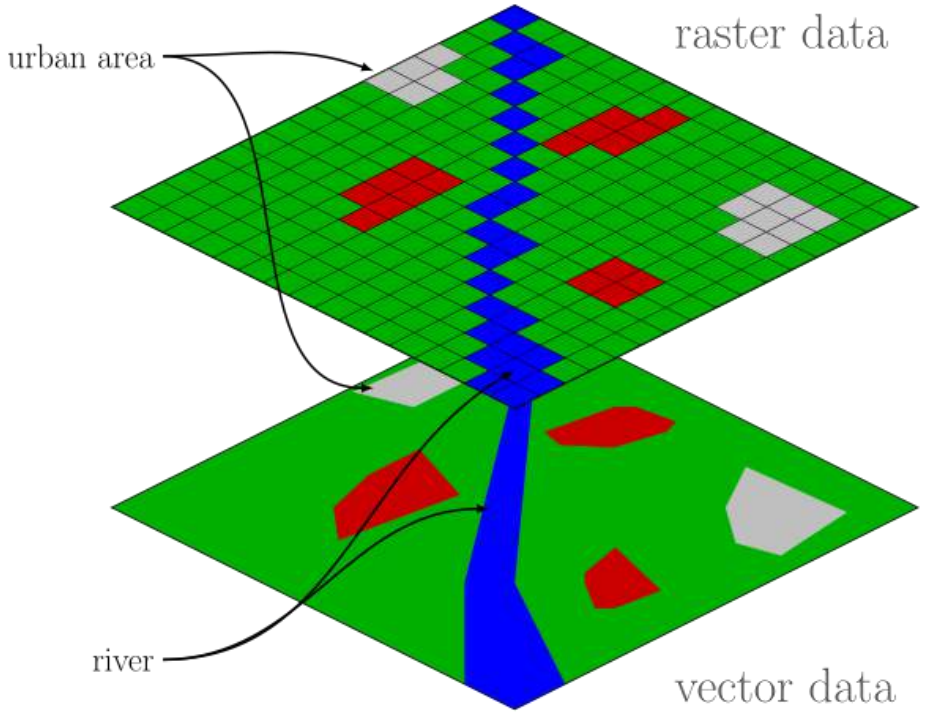

Fig: Raster and Vector Data

Examples:

- Point data representing cities or sampling locations.
- Line data representing rivers, roads, or pipelines.
- Polygon data representing land parcels, administrative boundaries, or land use.

Types:

- Points: Represent specific locations with no extent.
- Lines: Represent linear features connecting points.
- Polygons: Enclose areas and represent features with a defined boundary.

Advantages:

- Efficient for representing discrete features with clear boundaries.
- Topological relationships facilitate spatial analysis.
- Compact storage of attribute information.

Disadvantages:

- Less suitable for representing continuous phenomena.
- May require more data to represent the same area compared to raster data.
- Not as efficient for storing and processing large datasets with continuous variation.