Advanced GIS Utilization

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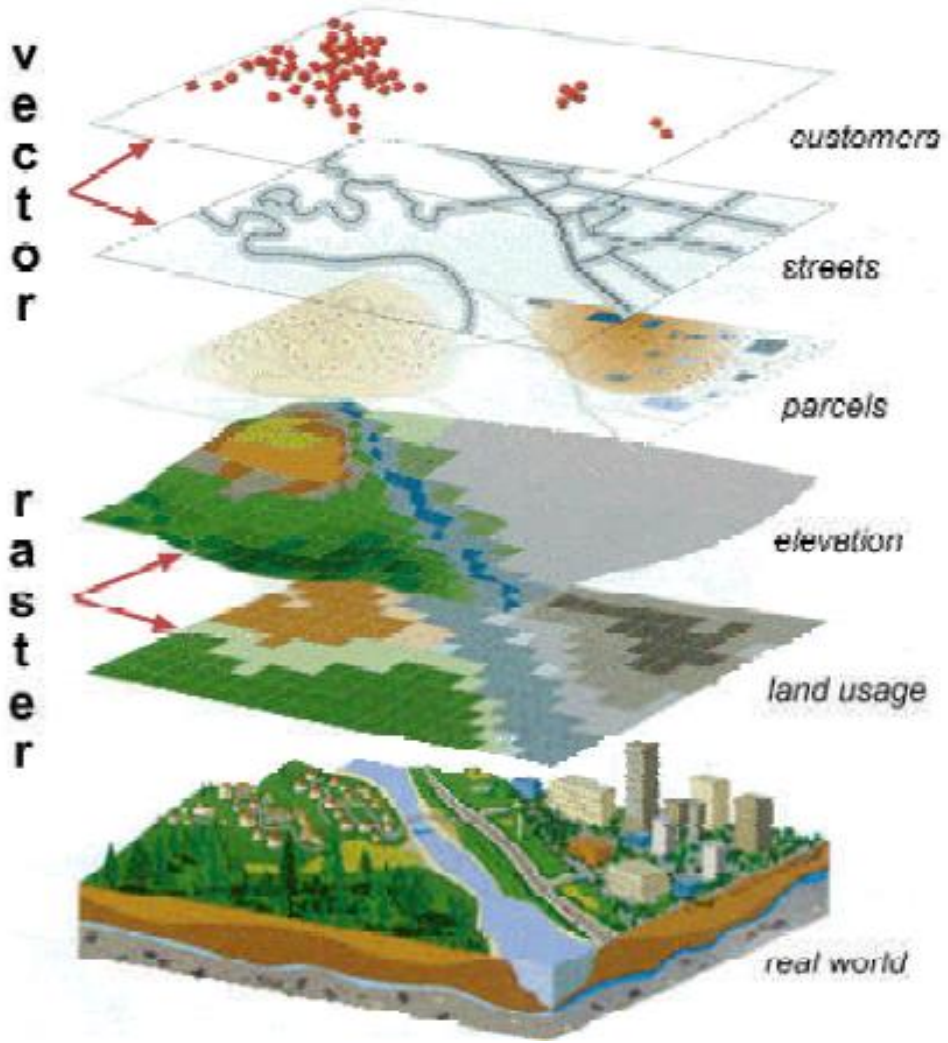
Geographic Information System

"A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information."

GIS is based on geographical world realities and the persistence of landforms and human-made structures in physical space.



Geographical information is helpful to help people to be aware of their real-time location, in relation to other features of the landscape

More recent GIS applications have placed databases of information onto a geographical time-space to enhance analysis and decision-making.

Geographic Information Systems (GIS) technology is used **to manage** and **utilize** geographic data, and is widely recognized as an **essential tool** in such diverse fields as forest management, urban planning, engineering, municipal management, business, and environmental studies.

http://www.bcit.ca/study/programs/9100padvdip

GIS applications

mapping locations: GIS can be used to map locations. GIS allows the creation of maps through automated mapping, data capture, and surveying analysis tools.

mapping quantities: People map quantities, like where the most and least are, to find places thatmeet their criteria and take action, or to see the relationships between places. This gives an additional level of information beyond simply mapping the locations of features.

mapping densities: While you can see concentrations by simply mapping the locations of features, in areas with many features it may be difficult to see which areas have a higher concentration than others. A density map lets you measure the number of features using a uniform areal unit, such as acres or square miles, so you can clearly see the distribution.

finding distances: GIS can be used to find out what's occurring within a set distance of a feature.

mapping and monitoring change: GIS can be used to map the change in an area to anticipate future conditions, decide on a course of action, or to evaluate the results of an action or policy.

Geospatial data

Geospatial data has both **spatial** and **thematic** components

Spatial component

The observations have two aspects in its localisation

- absolute localisation based in a coordinates system
- topological relationship referred to other observations

Thematic component

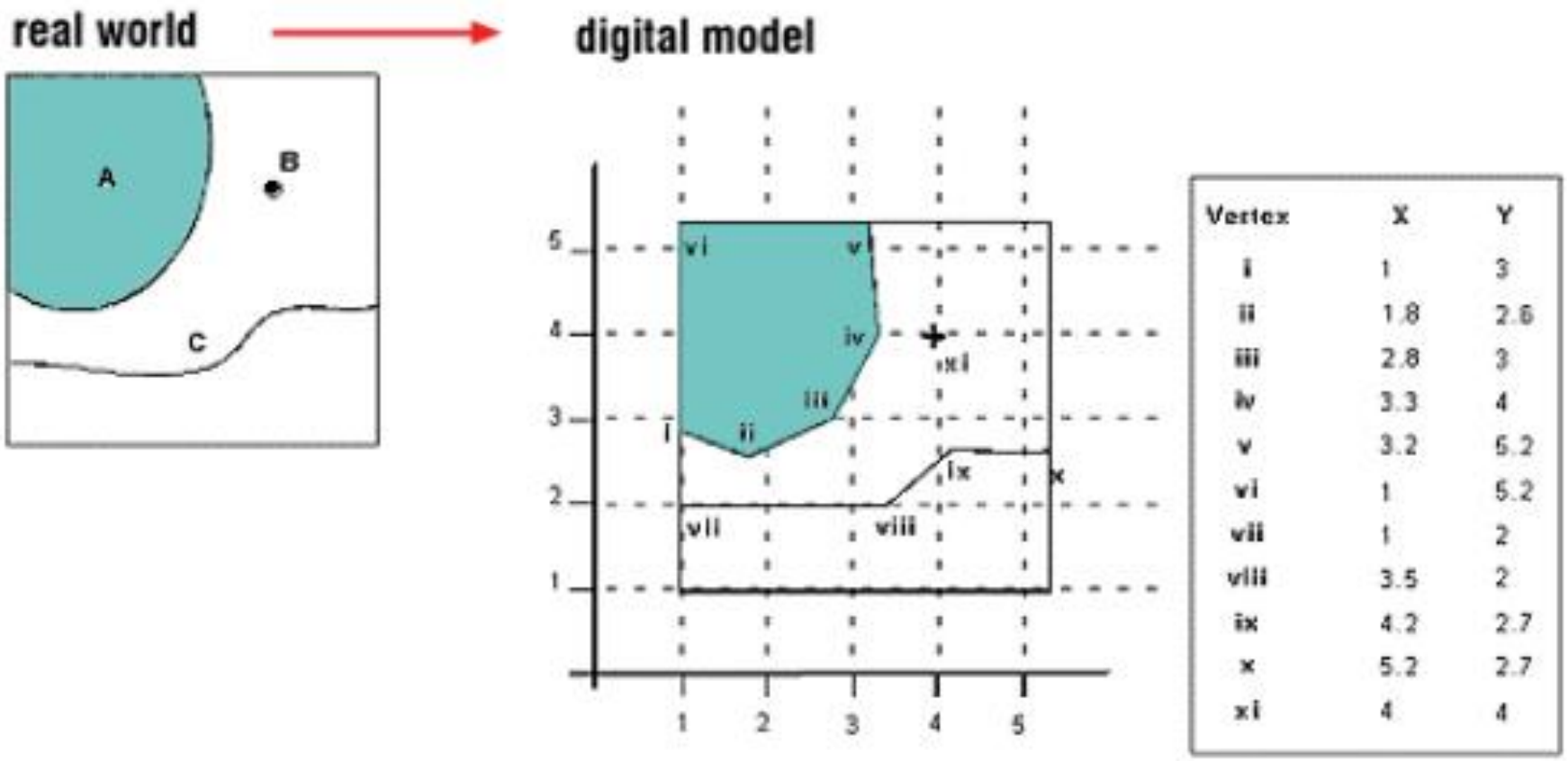
The variables or attributes can be studied considering the thematic aspect (statistics), the locational aspect (spatial analysis) or both (GIS).

Digital representation of geospatial data

digital	analogue
easy to update	whole map to be remade
easy and quick transfer (e.g. via internet)	slow transfer (e.g. via post)
storage space required is relatively small (digital devices)	large storage space required (e.g. traditional map libraries)
easy to maintain	paper maps disintegrate over time
easy automated analysis	difficult and inaccurate to analyse (e.g. to measure areas and distances)

Vector data

comprised of lines or arcs, defined by beginning and end points, which meet at nodes



Vertex	X	Y
i	1	3
ii	1.8	2.6
iii	2.8	3
iv	3.3	4
v	3.2	5.2
vi	1	5.2
vii	1	2
viii	3.5	2
ix	4.2	2.7
x	5.2	2.7
xi	4	4

Vector representation of data

co-ordinate

Pairs of numbers expressing horizontal distances along orthogonal axes, or triplets of numbers measuring horizontal and vertical distances, or n-numbers along n-axes expressing a precise location in n-dimensional space. Co-ordinates generally represent locations on the earth's surface relative to other locations.

point

A zero-dimensional abstraction of an object represented by a single X,Y co-ordinate. A point normally represents a geographic feature too small to be displayed as a line or area; for example, the location of a building location on a small-scale map, or the location of a service cover on a medium scale map.

line

A set of ordered co-ordinates that represent the shape of geographic features too narrow to be displayed as an area at the given scale (contours, street centrelines, or streams), or linear features with no area (county boundary lines). A lines is ynonymous with an arc.

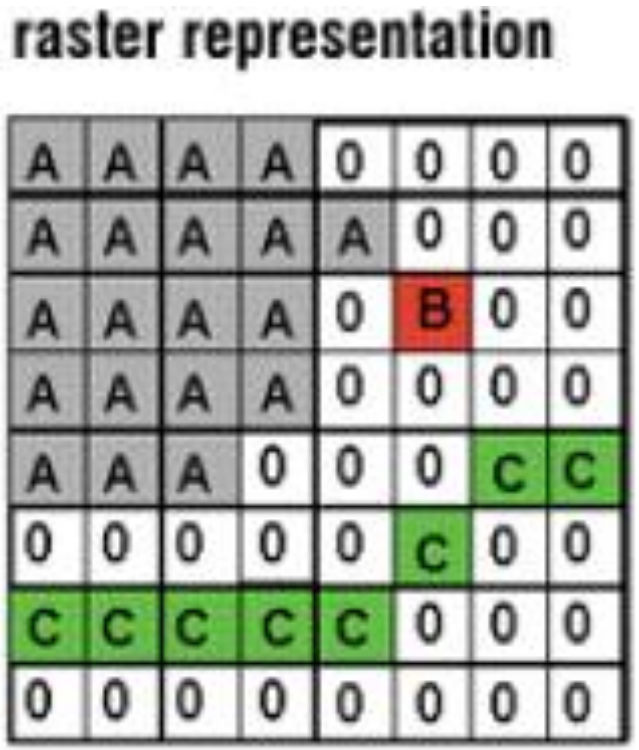
polygon

A feature used to represent areas. A polygon is defined by the lines that make up its boundary and a point inside its boundary for identification. Polygons have attributes that describe the geographic feature they represent

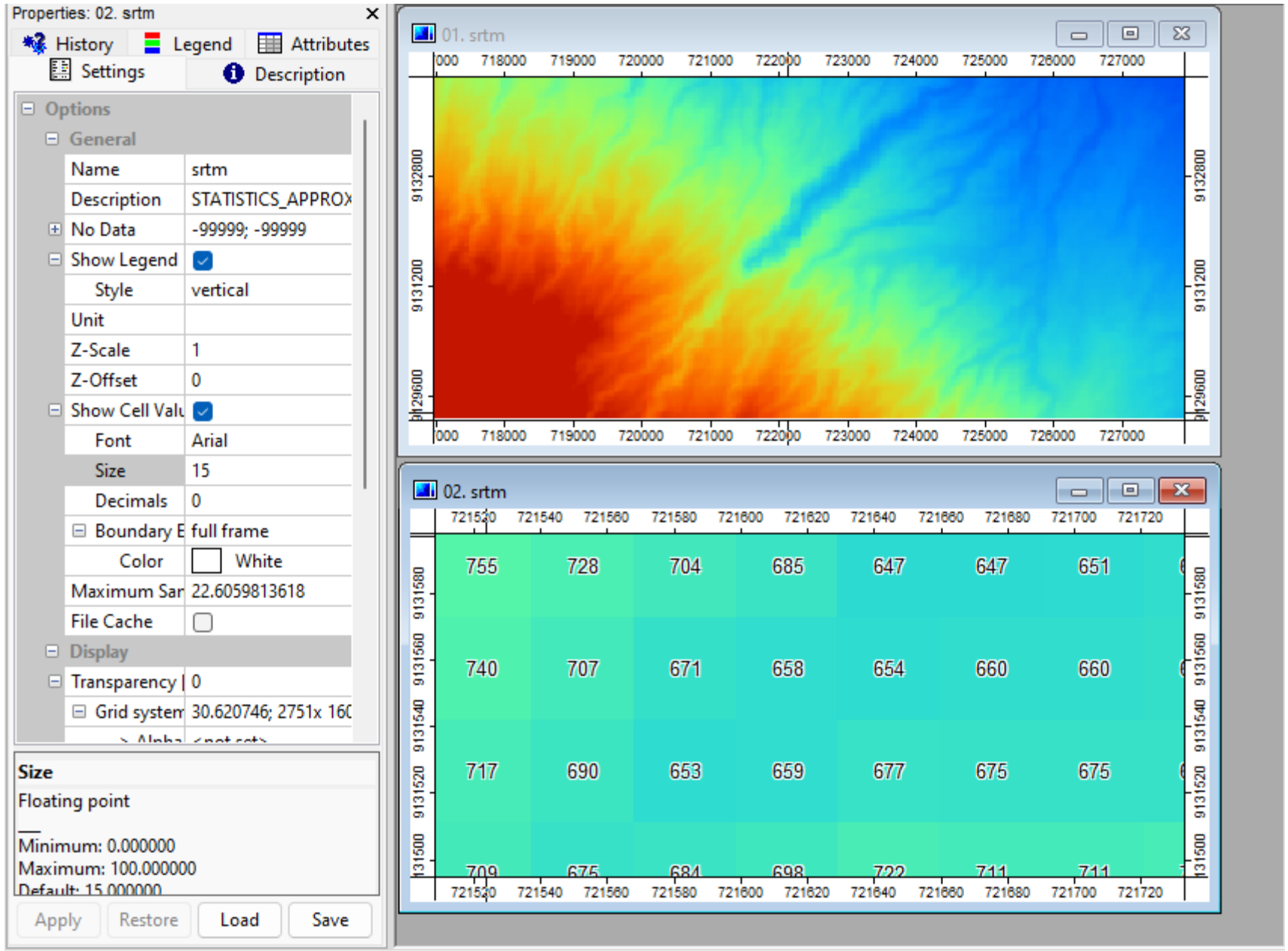
Raster data

an abstraction of the real world where spatial data is expressed as a matrix of cells or pixels with spatial position implicit in the ordering of the pixels

With the raster data model, spatial data is not continuous but divided into discrete units.



pixel	value
1	A
2	A
3	A
4	A
5	0
6	0
7	0
8	0
9	A
10	A
11	A
12	A
13	A
14	0
15	0
16	0
.	.
.	.
.	.
62	0
63	0
64	0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Legend
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15
Decimals
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0
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30.620746; 2751x 160
Size
Floating point
Minimum: 0.000000
Maximum: 100.000000
Default: 15.000000
Apply
Restore
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02. srtm
755 728 704 685 647 647 651
740 707 671 658 654 660 660
717 690 653 659 677 675 675
709 675 684 698 722 711 711

Thank you so much ...