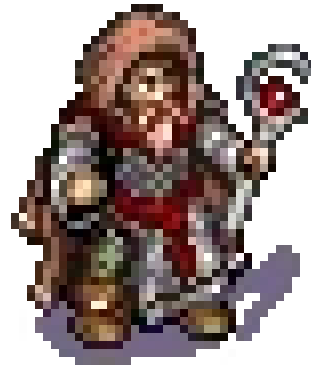


Topic : Vector & Digitising



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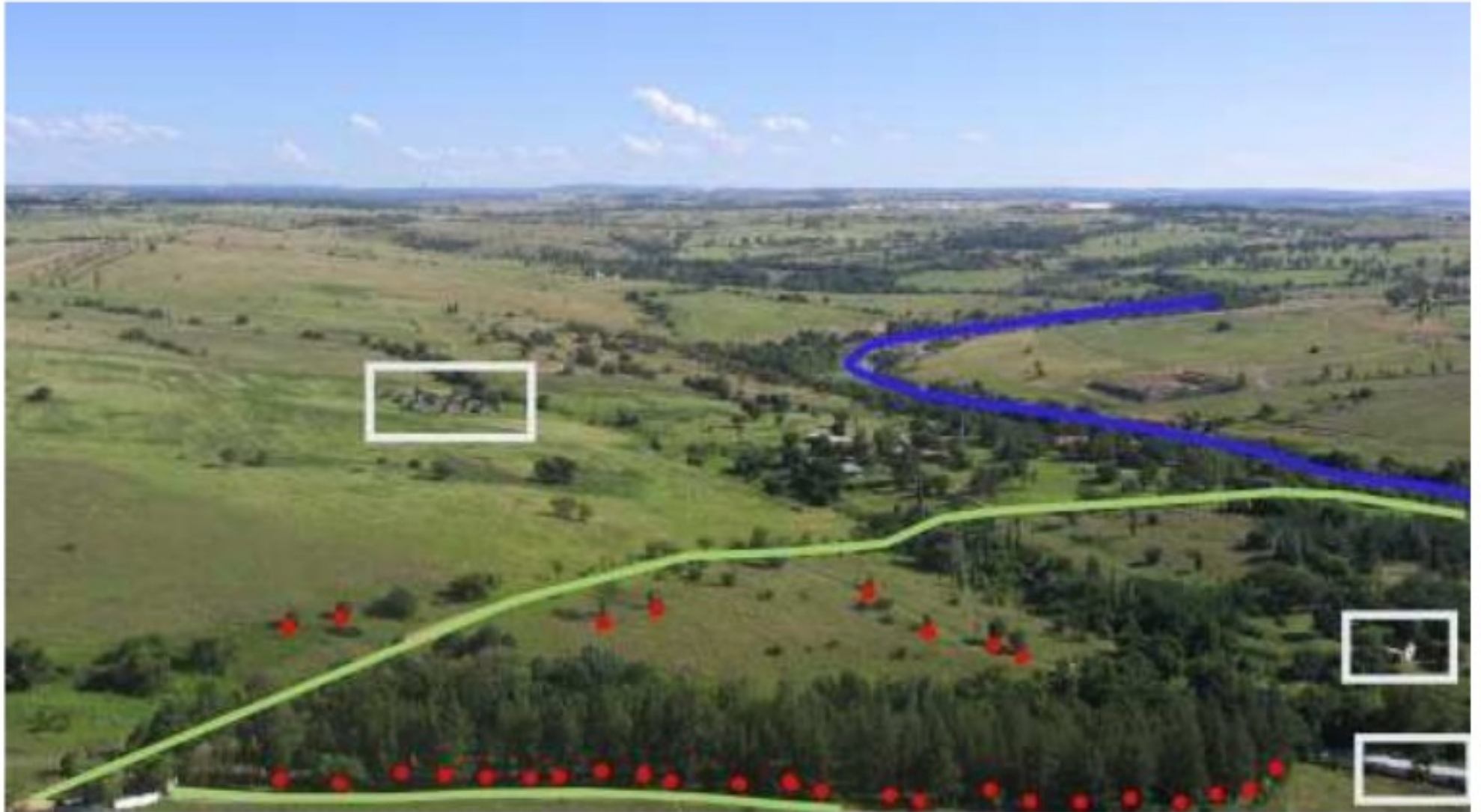
About the topic

- We will talk further about vector data in GIS
- At the end of this topic you will know about:
 - How vector data represents features
 - What vector attribute is
 - What and how to do digitising

Vector Data

- Vector Data consists of vertices
- Vertice
 - X (e.g : latitude)
 - Y (e.g : longitude)
 - Z (e.g : height above sea level)
- Vector Data represents world's real feature
 - Point features
 - 1 vertice,
 - 0 or more attributes (e.g : [Name : Toyib's home, Roof Color : Red])
 - Poly-line features
 - At least 2 vertice,
 - 0 or more attributes (e.g: [Name : Tidar Street, length : 200 m])
 - Polygon features
 - At least 3 vertice,
 - 0 or more attributes (e.g: [Name : Stadion Gajayana, usage : sport])

Figure 11: Landscape features as we would present them in a GIS. Rivers (blue) and roads (green) can be represented as lines, trees as points (red) and houses as polygons (white).



Something to think about

- $0+0+0+0=?$
- $5*0=?$
- $\text{Infinite}*0=?$
- Now consider this:
 - Point doesn't has any length (Length of point is zero)
 - Line has non-zero length
 - $\text{Point}+\text{point}+\text{point}+\dots+\text{point} = \text{line}$
Therefore: $0+0+0+0+0+\dots+0 \neq 0$
 - The same thing can be applied to line and area.

Point Feature in Detail

- There is no such a point thing in the real world, even a hydrogen atom still have diameter.
- Why do we need point feature?
 - Matter of sense
 - A city will be a point in the world map
 - A city will be a polygon in state/province map
 - Matter of feature
 - Telephone pole is not make a sense to be represented as polygon feature.
- Point feature can has attributes

Polyline Feature in Detail

- Polyline is used to represent linear features
- Curve polyline will be jagged or seems angular in a large scale
- Polyline can have attributes

Figure 12: Polylines viewed at a smaller scale (1:20 000 to the left) may appear smooth and curved. When zoomed in to a larger scale (1:500 to the right) polylines may look very angular.



Polygon Feature in Detail

- Polygon is used to represent enclosed area
- As Polyline, curve polygon will be jagged or seems angular in a large scale
- Polygon can has attributes
- Something to think of :
 - Can we exactly draw the boundary between an island and the sea?

Digitising

- Digitising is a process to create or modify geometry data in the layer
- Digitising is used to make your own data in GIS. We will try it later.

Common Problem in Vector Data

- Scale

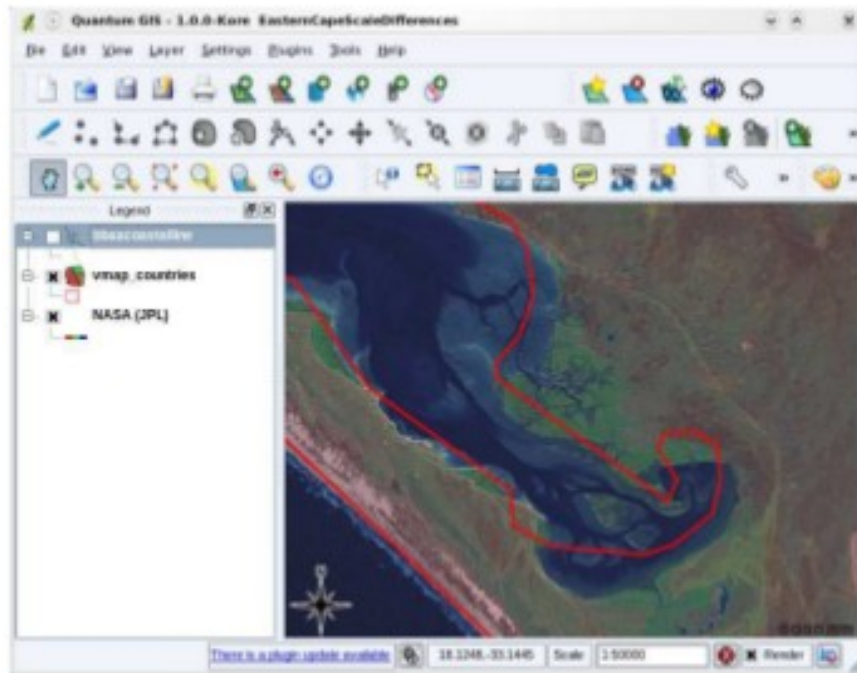
There would be a problem if you use a low scale map to digitize a data and apply the digitization result into large scale map

- Sliver

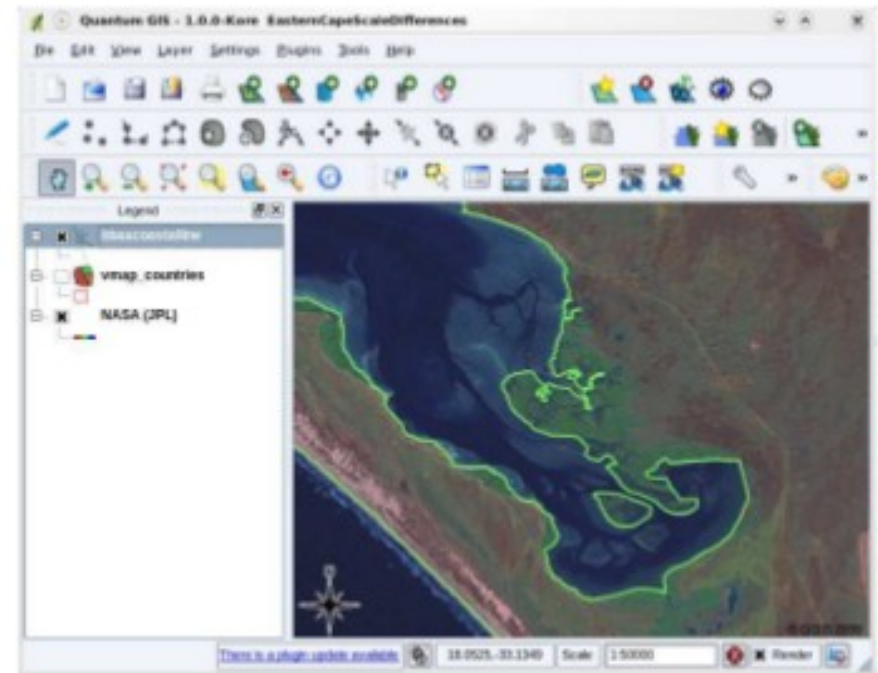
Inaccurate line end or boundary

- Overshoots
- Undershoots

Common Problem in Vector Data - Scale



(a) Vector data (red lines) that was digitised from a small scale (1:1000 000) map.



(b) Vector data (green lines) that was digitised from a large scale (1:50 000) map.

Common Problem in Vector Data-Sliver

Figure 15: Slivers occur when the vertices of two polygons do not match up on their borders. At a small scale (e.g. 1 on left) you may not be able to see these errors. At a large scale they are visible as thin strips between two polygons (2 on right).

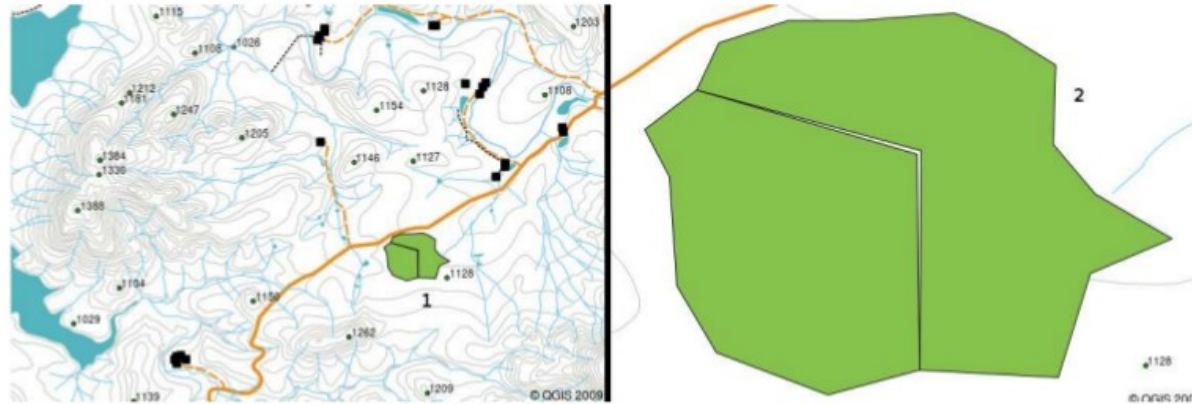


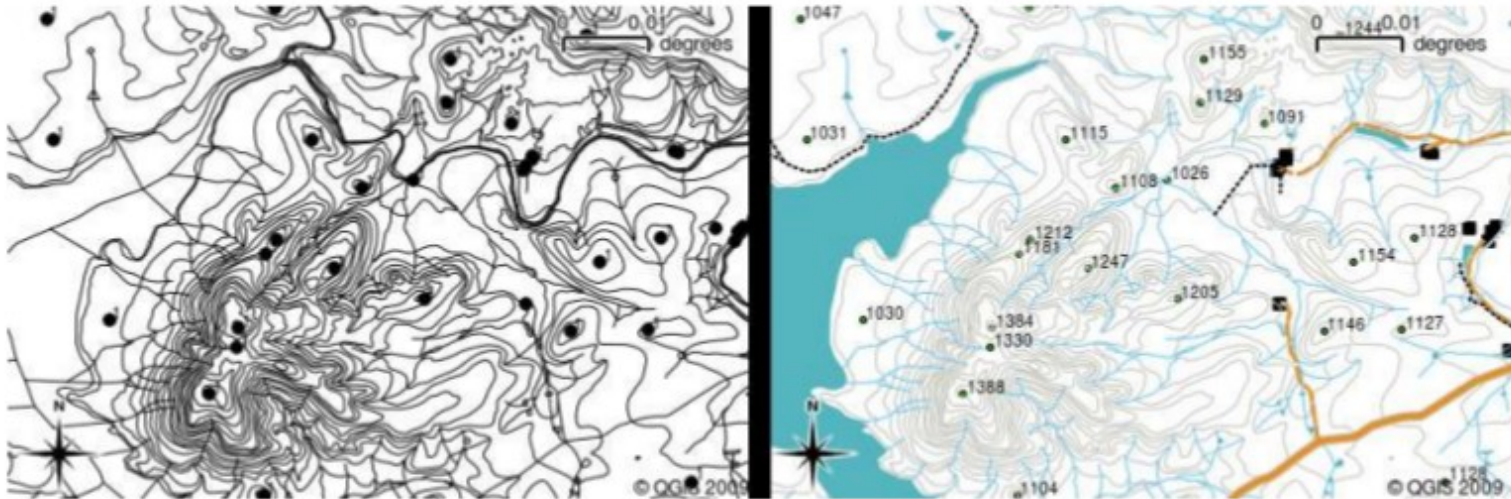
Figure 16: Undershoots (1) occur when digitised vector lines that should connect to each other don't quite touch. Overshoots (2) happen if a line ends beyond the line it should connect to.



Vector Data Attributes

- Can you imagine:
 - Your map represent a mountain, a town, and any point feature with the same color and thickness?

Figure 19: Maps come to life when colour and different symbols are used to help you to tell one type of feature from the next. Can you tell the difference between rivers, roads and contours using the map on the left? Using the map on the right it is much easier to see the different features.

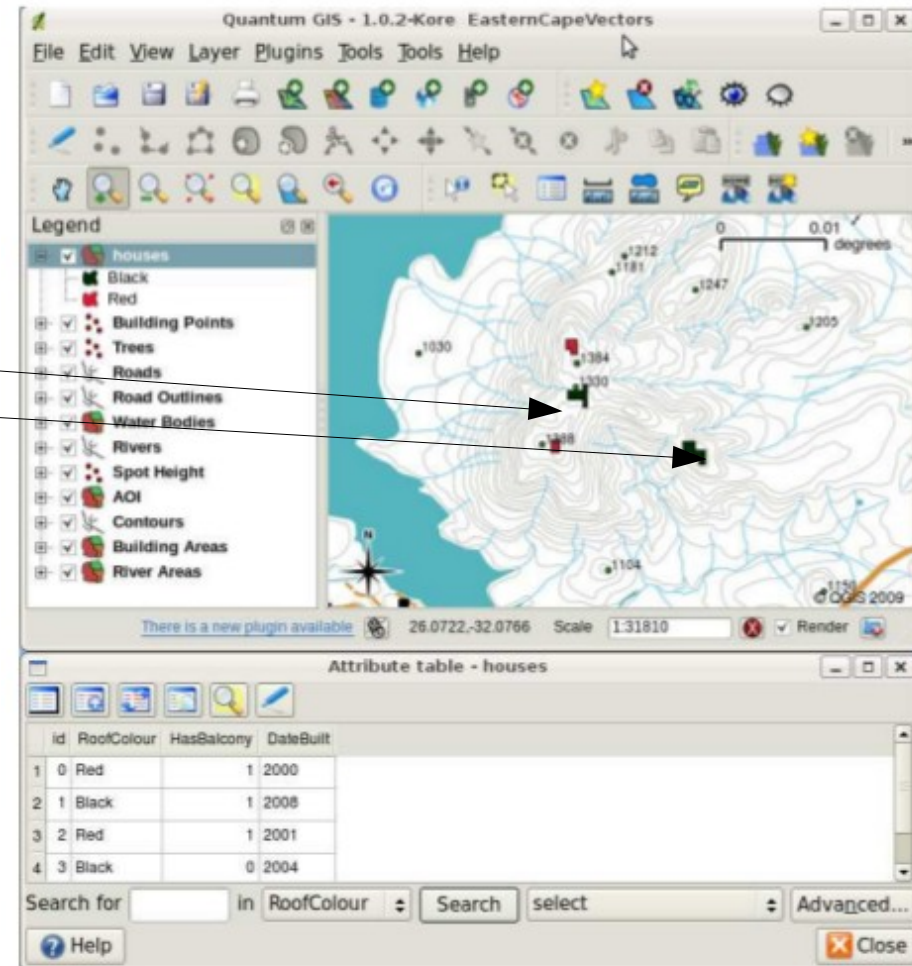


Vector Data Attribute

Roof Colour: Red
Has balcony?: Yes
Year Built: 2000

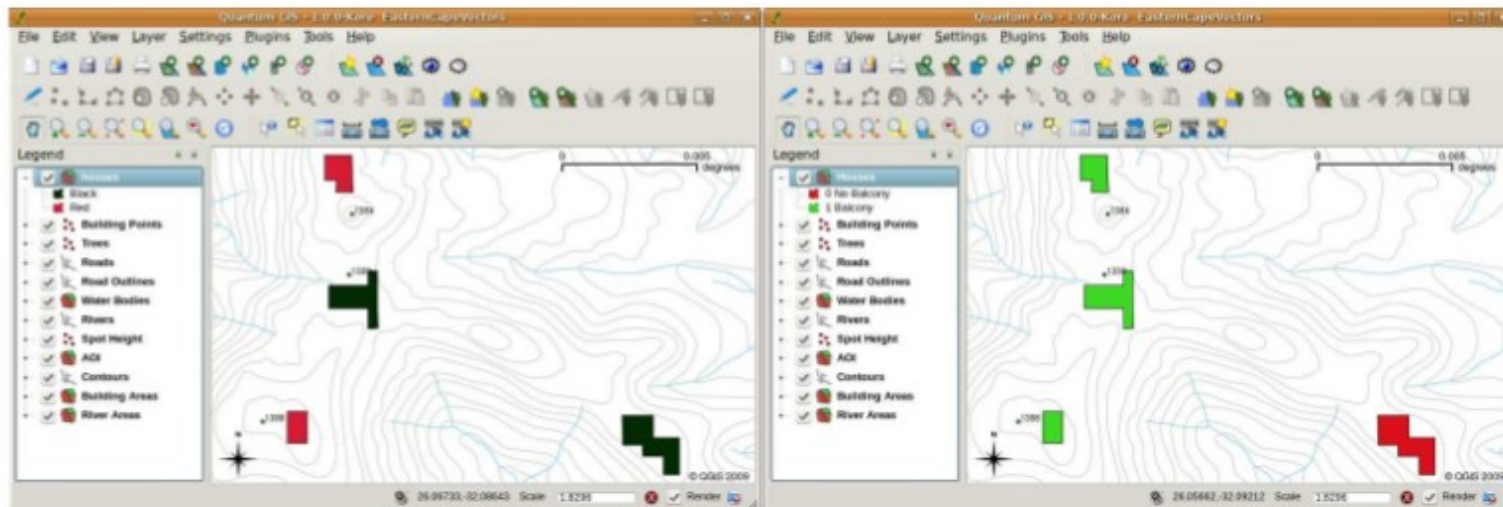


Roof Colour: Black
Has balcony?: No
Year Built: 2002



Vector Data Attribute

Figure 22: In a GIS Application, we can draw features differently depending on their attributes. On the left we have drawn house polygons with the same colour as the roof attribute. On the right we colour coded houses according to whether they have a balcony or not.



Vector Attributes as Table

	Field 1: YearBuilt	Field 2: RoofColour	Field 3: Balcony
Record 1	1998	Red	Yes
Record 2	2000	Black	No
Record 3	2001	Silver	Yes

Vector Attribute Symbol

- Single Symbol
- Graduated Symbol
- Continuous Color Symbol
- Unique Value Symbol



Next, We will try to do digitising process
Take a break for 10 minutes.

Digitising

- Get a raster image.
- Perform digitising

What's next

- Googling and learn about GeoJSON
- Look for Cloudmade Leaflet in internet
- Find a way to convert:
 - *.img into *.png
 - *.shp into *.json



Questions?

Thank you