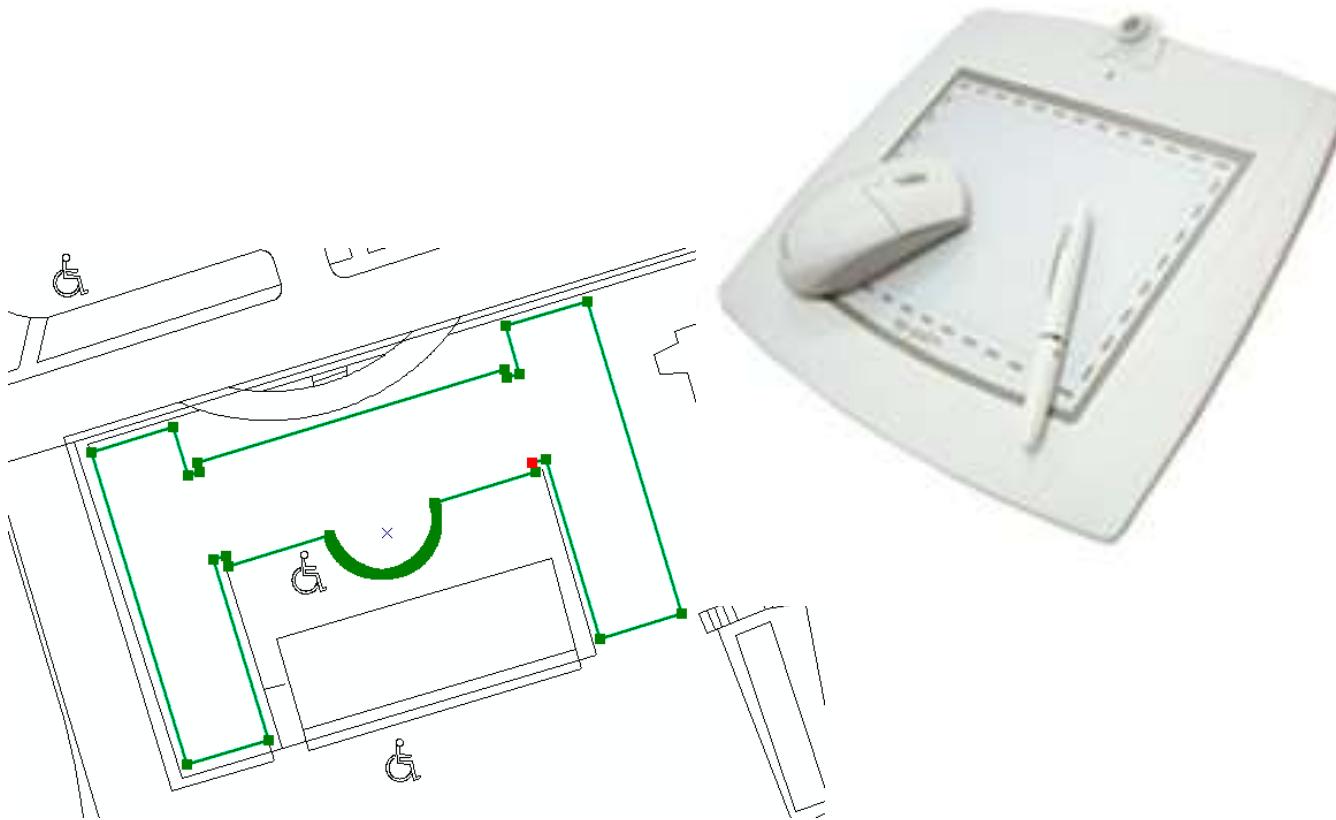


Digitizing - Scanning



digitizer is a tool used to convert hand-drawn images into a format suitable for computer processing. Images are usually drawn onto a flat surface with a stylus and then appear on a computer monitor or screen. Digitizer tablets can also be used as an input device, receiving information represented in drawings and sending output to a computer application and PC-based software like GIS .

A **graphics tablet** is a flat surfaces on which you draw with a mouse or a **pen-like** device. The **tablet** is attached to the computer. The **tablets** capture the image as data which is then stored as a file or document.

The different between the digitizer and other tablet in the electronic net been down the flat surface . Each cell in that net have defined coordinate (x , y) referenced to original point (0 , 0) , when we do click by mouse at any point it will be drawn on screen with same place , and by repeat that work to another points it drawn as lines on screen . Finally we can input all the features on map or image to the screen within GIS software .

Why Digitize

- New maps
- Map features are wrong
- Missing features

Digitizing Sources

- Aerial Images and satellite images
- Orthophotos
- Paper Maps

Digitizer principles

all feature that should been digitized (no missing data)

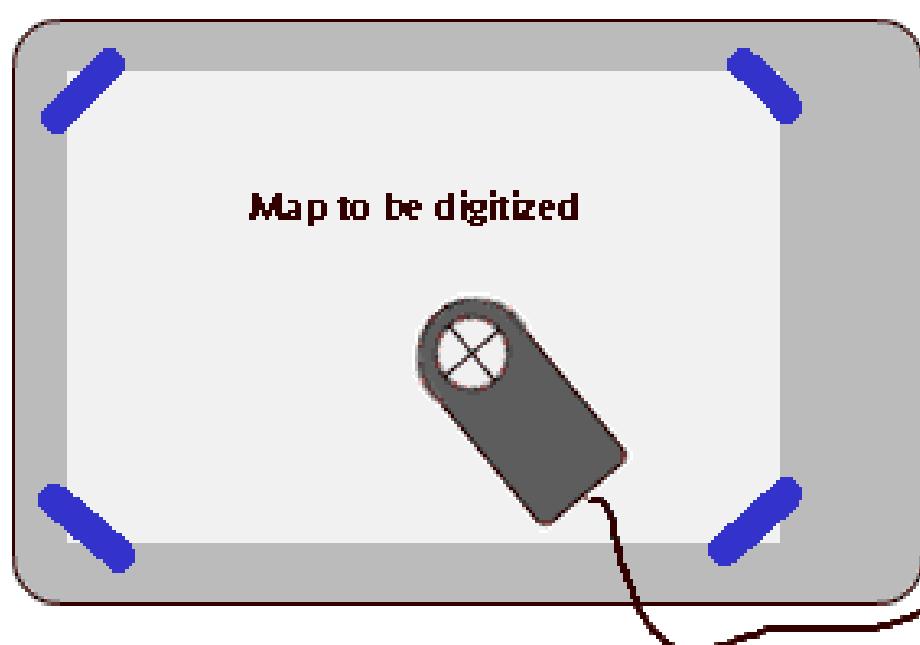
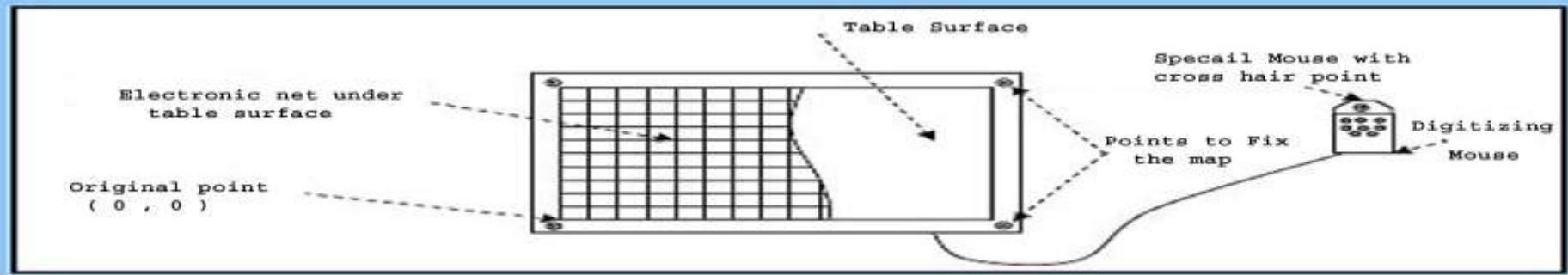
No extra data for features

all the feature at the right place and arcs have right shape (data is accurate)

feature should be connect

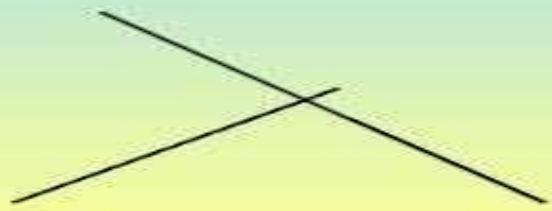
all polygon have one label; point

all the feature within outer boundary

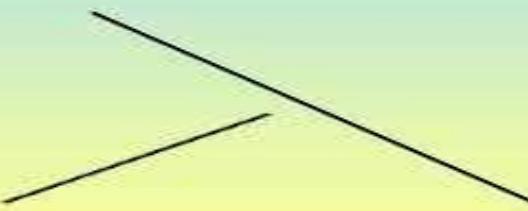


Digitising errors

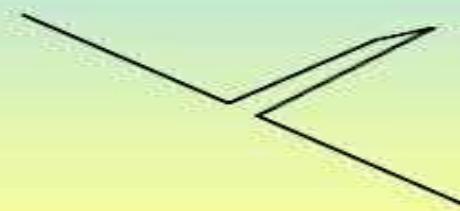
User error causes overshoots, undershoots and spikes at intersection of lines.



overshoot



undershoot



spike



Dangle



Switchback

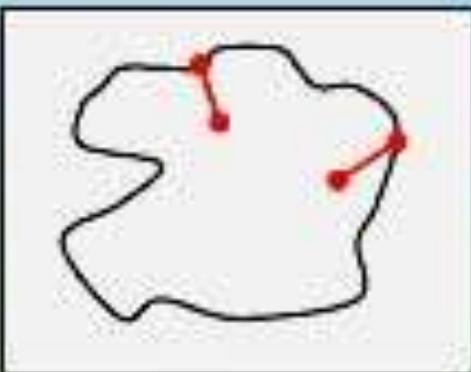


Knote

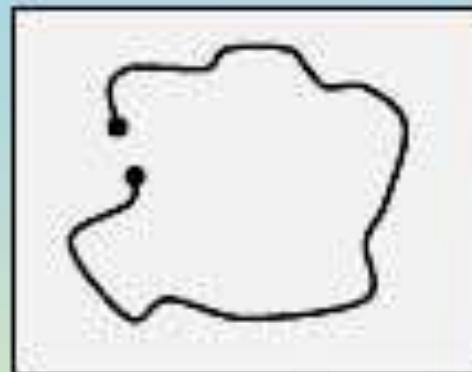


Loope

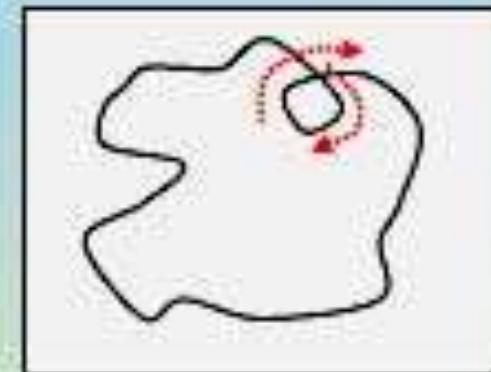
Examples of errors in spatial databases



Dead end



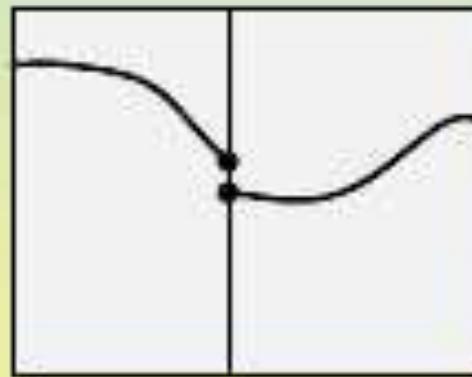
Leaking polygon



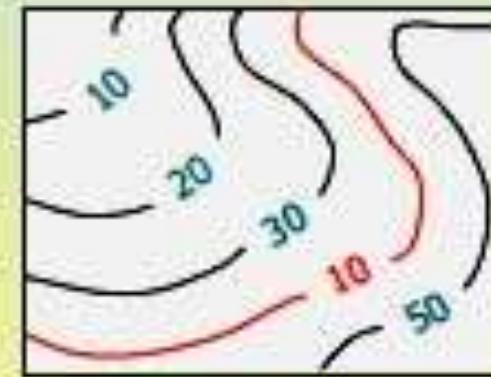
Invalid polygon



Slivers



Edge shift

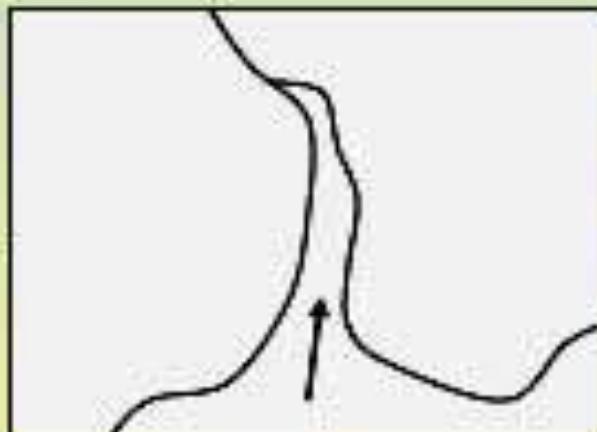
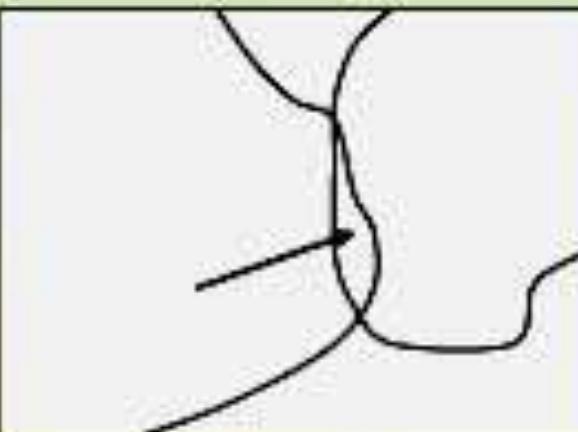
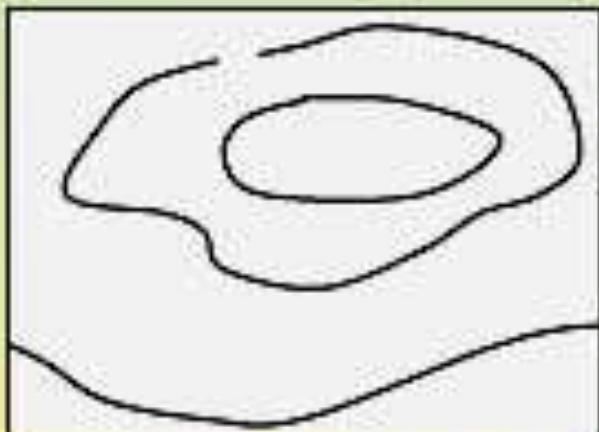


Attribute errors

Error detection and editing

- Common errors in spatial data

- polygon not closed
- sliver
- gap
- attribute errors, etc.



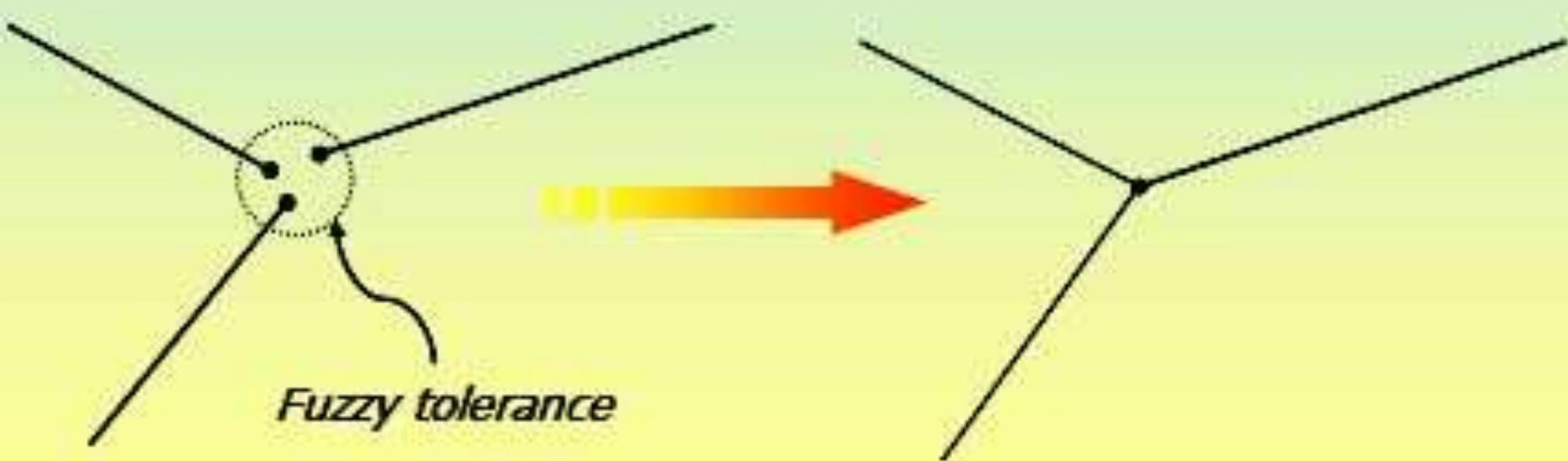
Polygon not closed

Sliver

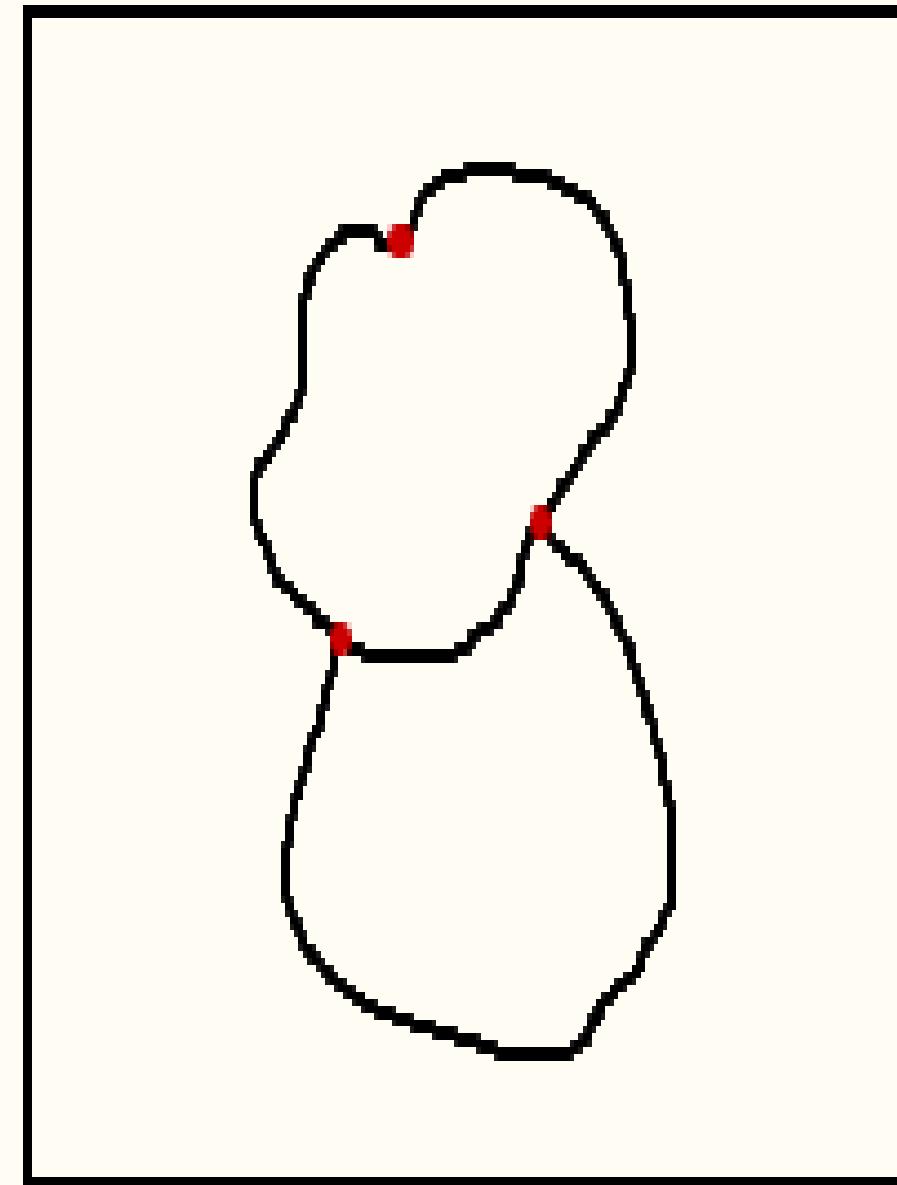
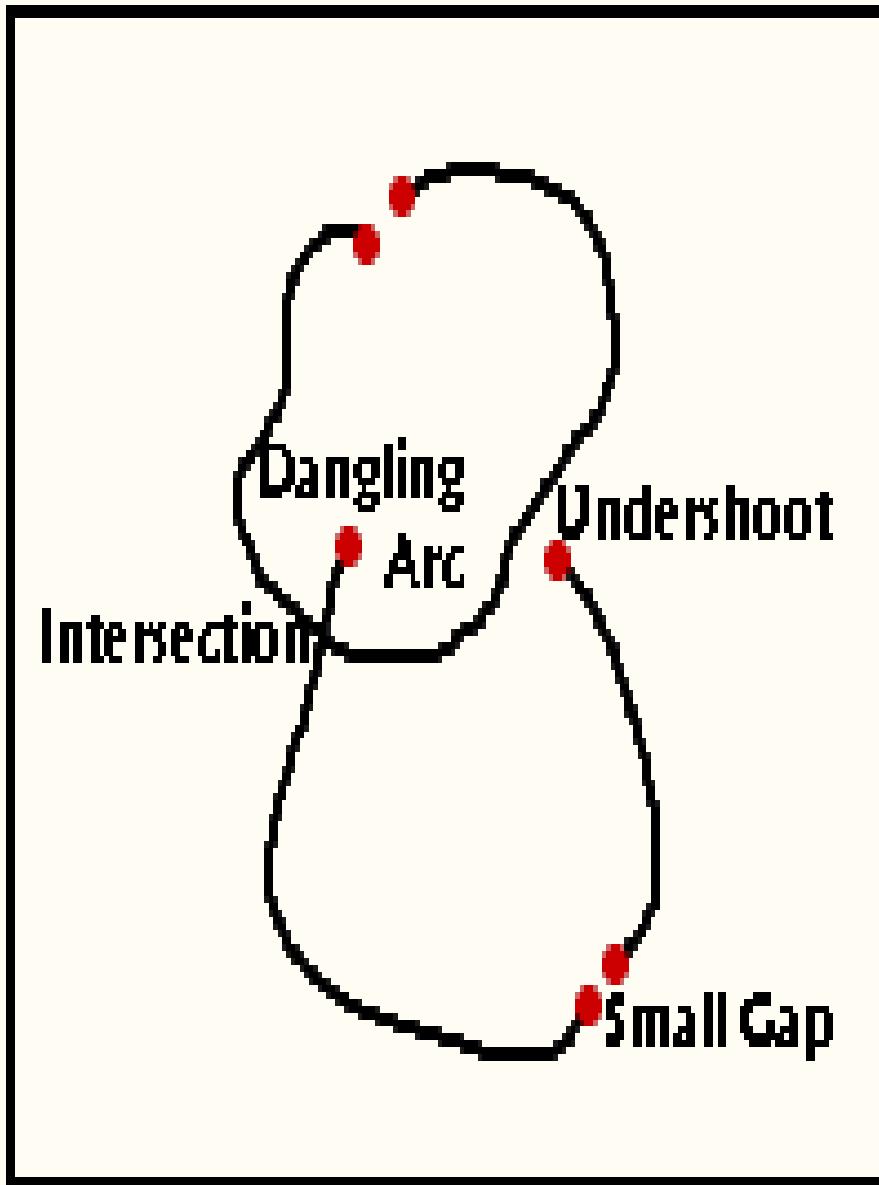
Gap

Error correction procedures

- Setting a fuzzy tolerance
- Connecting nodes
- Re-building topology



Spaghetti Data Topological Data

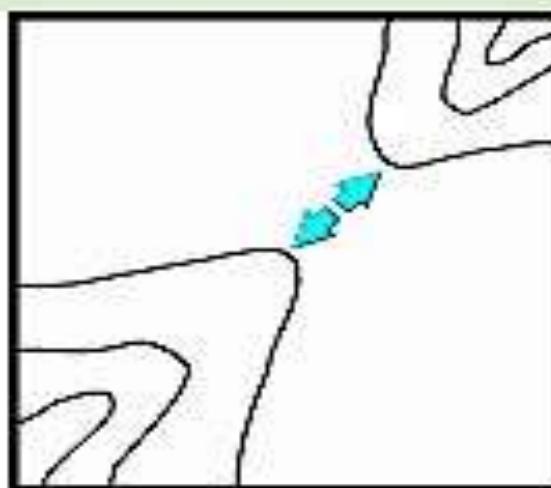


Cartographic errors

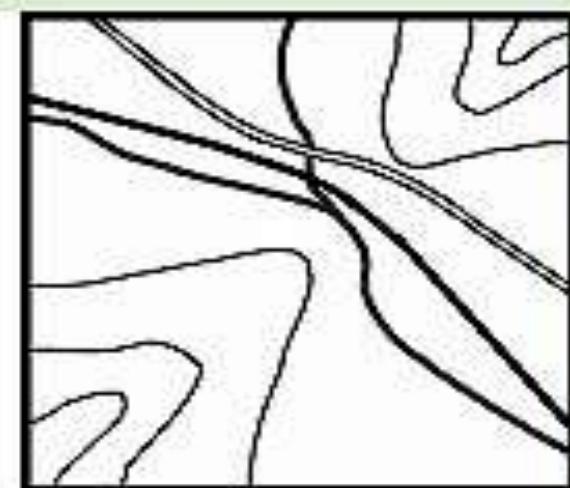
- Maps are meant to display information and do not always accurately record locational information.
- e.g. when a railway, stream and road all go through a narrow mountain pass, the pass may actually be depicted wider than its actual size.



Original Location



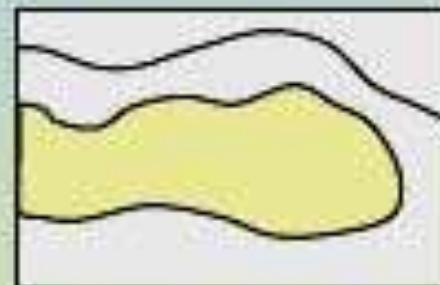
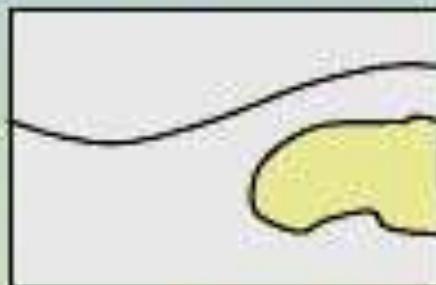
Depicted Wider



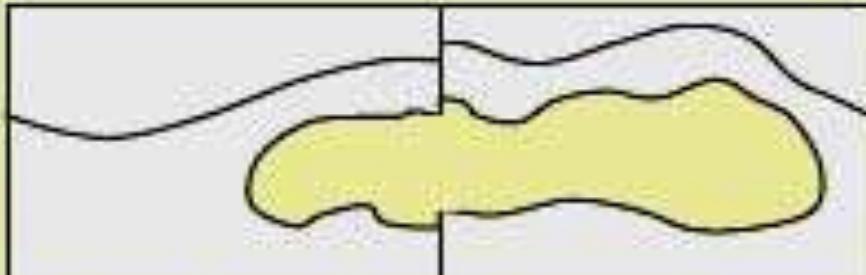
Final Map

Edge matching

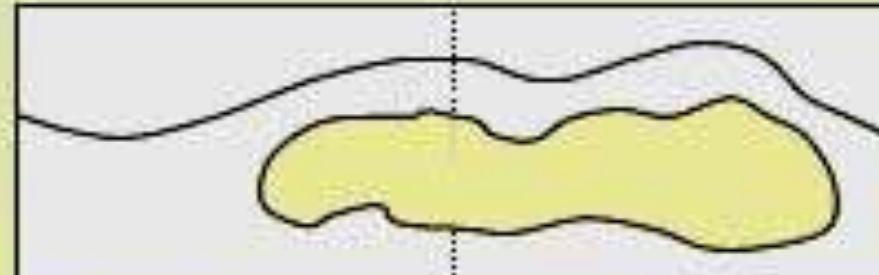
- Joining map sheets
- Automated or manual procedures



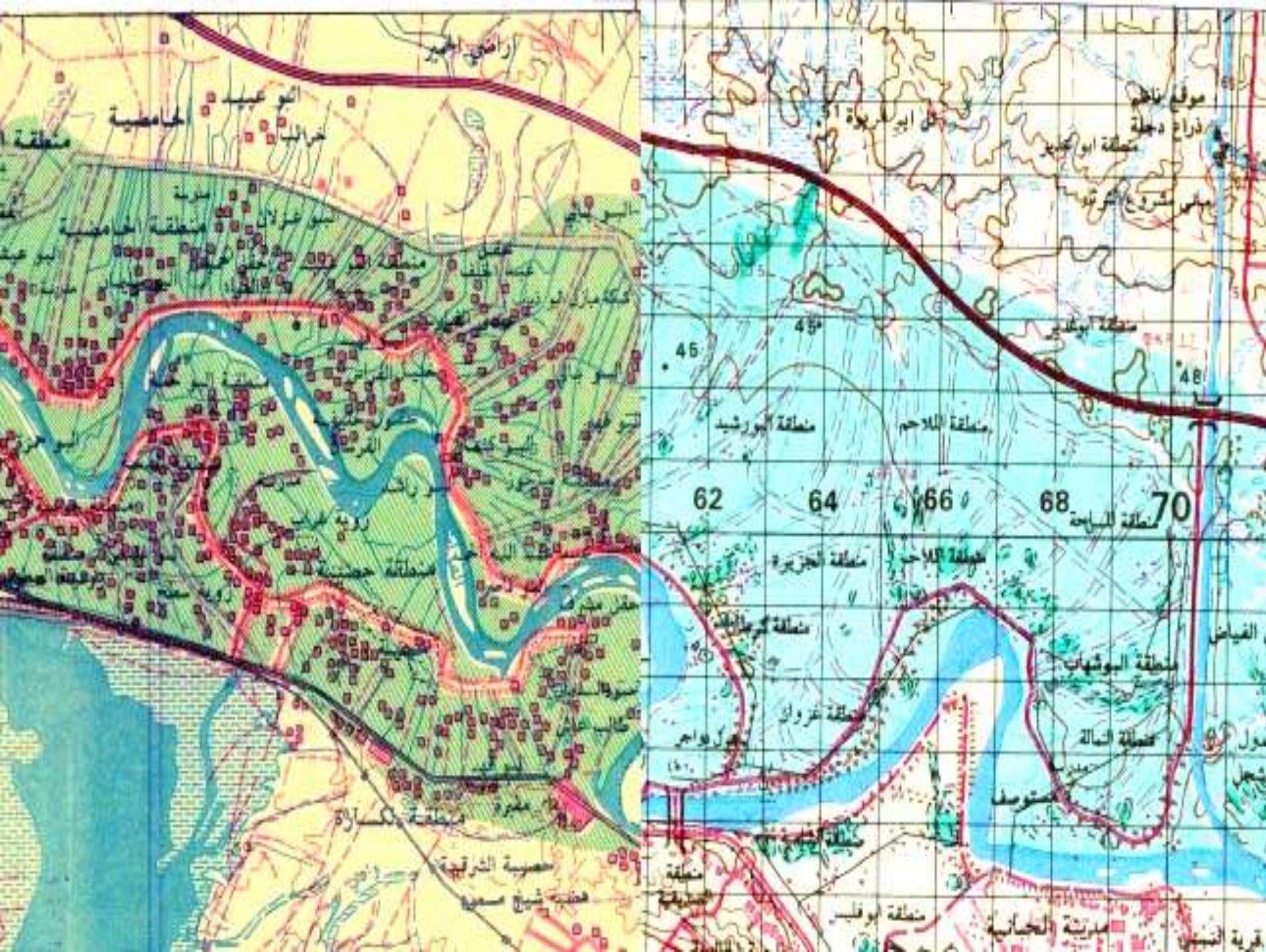
Original two map sheets



Two sheets brought together
showing discontinuities



Derived single sheet with
edges adjusted



2- Scanners

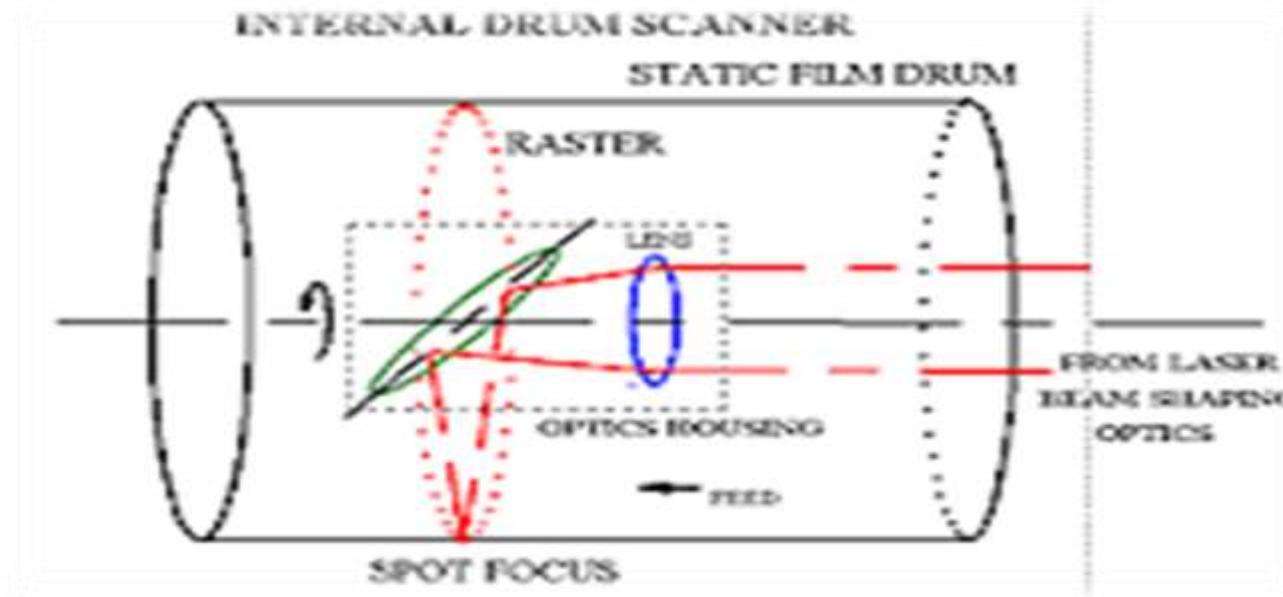
are used by the publishing the capture detailed images. They use a technology called a **photomultiplier tube** (PMT). In PMT, the document to be scanned is fix on a glass cylinder. At the center of the cylinder is a sensor that splits light from the document into three beams. Each beam is sent through a color filter into a photomultiplier tube where the light is changed into an electrical signal.

The basic principle of a scanner is to analyze an image and process it in some way. Image and text capture allow you to save information to a file on your computer. You can then alter or enhance the image, print it out or use it on

The core component of the scanner is the **CCD array**. is the most common technology for image capture in scanners. Its collect convert photons (light) into electrons (electrical charge). These called **photosites**. each photosite is sensitive to light : The brighter light that hits a single photosite, if greater the electrical charge that will accumulate at that site.

The image of the document that you scan reaches the CCD array through a series of mirrors, filters and lenses. The document is placed on the **glass plate** and the **cover** is closed. The inside of the cover in most scanners is flat white. The cover provides a uniform background that the scanner software can use as a reference point for determining the size of the document being scanned.

The image of the document is reflected by an **mirror** to another mirror. In some scanners, there are only two mirrors while others use a three mirror approach. The last mirror reflects the image onto a **lens**. The lens focuses the image through a **filter** on the CCD array.



resolution and **sharpness**. Most scanners have a true hardware resolution of at least 300x300 **dots per inch** (dpi). The scanner's dpi is determined by the number of sensors in a single row (**x-direction sampling rate**) .