

Topics in Spatial Analysis

Fall ILGISA, 10/5/09

Carmi J. Neiger

Elmhurst College/Facility Wizard Software

Agenda

1. Hot Spots & Point Density Maps
2. Using Proximity Tools for Conflating Street Address Data
3. Understanding the Overlay Toolset: Identity, Intersect, Update and Union
4. **A Guided Discussion on Accuracy**

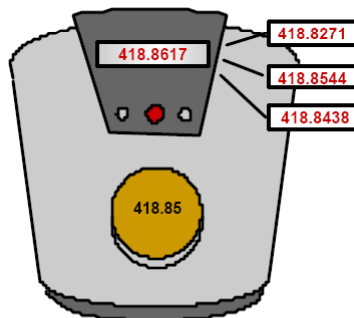
(Breaks will be declared as needed)

Precision, Accuracy & Resolution

How "accurate" do your map products need to be?

What does that actually mean?

Precision

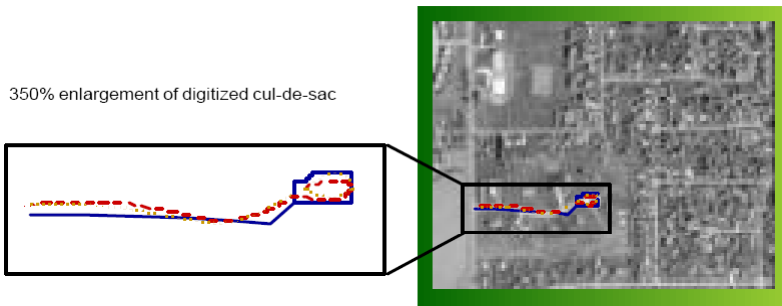


These replications indicate that the bathroom scale is precise only to 1/10th of a pound.

Precision refers to the smallest scale of replicability that can consistently and reliably be achieved by an instrument, or by a human operator.

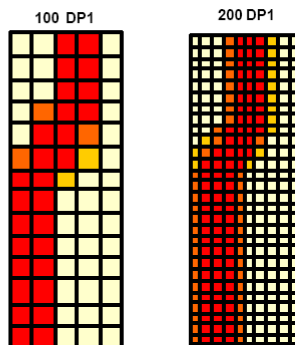
Precision

350% enlargement of digitized cul-de-sac



Precision

A street segment (line width = 0.02")
scanned from a paper map at:



Where would you digitize the line?

Accuracy

Accuracy refers to the truthfulness of map information. That truthfulness has two dimensions: attribute accuracy and positional accuracy.

Some examples of **attribute accuracy** are:

- § Do all portions of the region depicted as humid temperate climate really meet the criteria for classification as humid temperate?
- § Does I-802 converge to a 4-lane merged highway east of Chesterton, or should it be drawn as a divided highway along its entire length?
- § Was that a cold front over Ontario and western New York on yesterday's weather map, or should it have been an occluded front?
- § Is Unionvill spelled correctly?

Accuracy

Positional accuracy – refers to the proper placement of features, relative to other features and relative to the map's coordinate system.

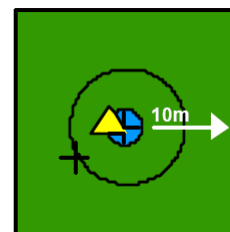
+ Precision = Accuracy
10 meter GPS receiver

▲ 1-3 meter GPS receiver

⊕ 0.1 meter GPS receiver



1:6,000 scale



1:600 scale

Resolution

Resolution is a measure of the smallest size object that can be detected or discriminated from its background.

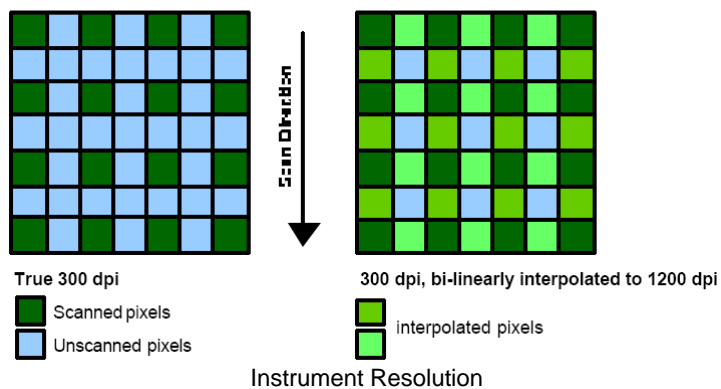
§ Instrument resolution

- digital scanner

§ Ground resolution:

- aerial photography
- satellite imagery

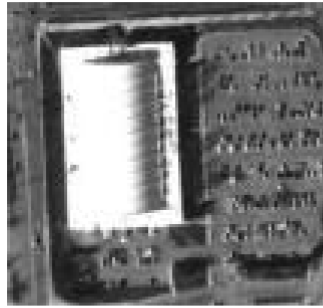
Resolution



Resolution

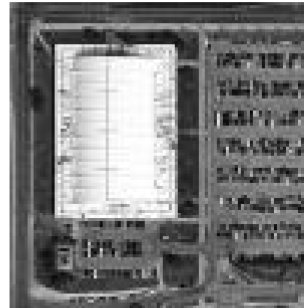
The same image scene at 3-meter and 1-meter ground resolutions

A.) 3-meter ground resolution



1 pixel = 3 m. × 3 m.

B.) 1-meter ground resolution



1 pixel = 1 m. × 1 m.
9 times the resolution of image A.

Ground Resolution

Precision, Accuracy, Resolution & Map Quality

Accuracy first

- § Higher resolution enables greater positional accuracy
- § Higher resolution (in imagery) enables greater control of attribute Accuracy

Precision second

- § Develop and practice sound production practices
- § Recognize and eliminate false precision

Acknowledgements

Many of the sources and images for this material came from websites which allowed the use and distribution of that material for educational purposes.

Special thanks go to Dr. Andrew Krmeneč, Chair of the Geography Department at Northern Illinois University in DeKalb, and Paul Sill, for use of materials from their Geography 256 course, *Maps and Mapping*.

Carmi's contact data:

Carmi J. Neiger
Facility Wizard Software
carmi.n@facilitywizard.com
Phone: 773-832-0200 x1128
Mobile: 847-651-1158
or
neigerc@elmhurst.edu