COA 690/790 Introduction to GIS

Lab 3 Registration and on-screen digitizing

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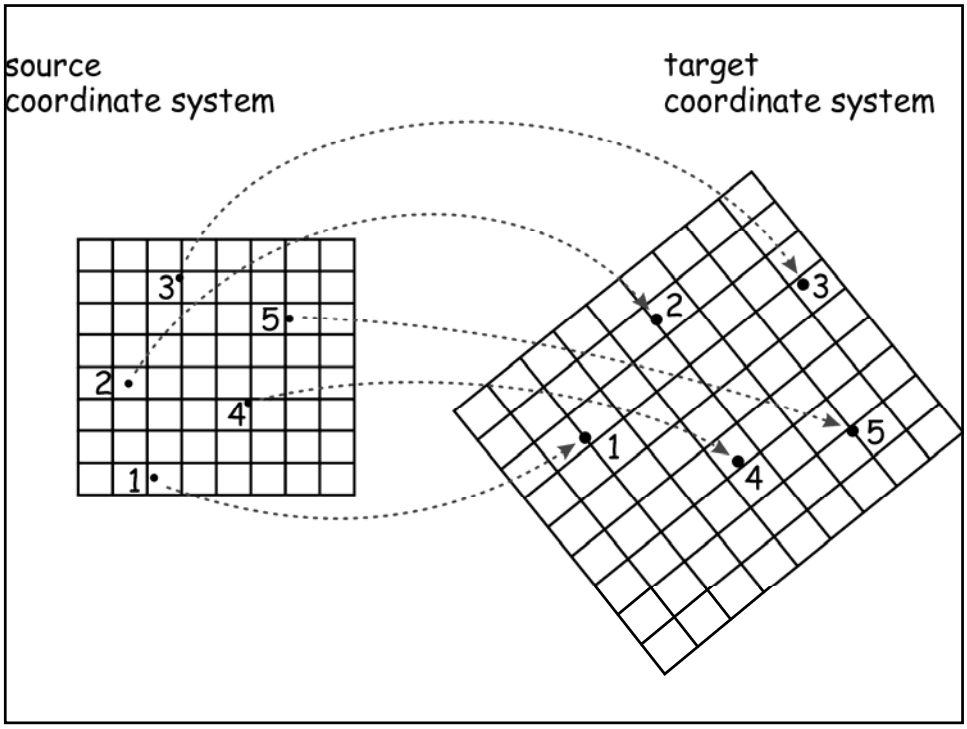
Registration

- Also referred as coordinate transformation: Conversion of digitizer or other coordinate data to an earth-surface coordinate system.
- Control points: Map projection coordinates and digitizer coordinates are known. They are used to estimate the coefficients for transformation equations.



Control points

- Criteria

  Should come from a source that provides the highest feasible coordinate accuracy.

  Accuracy should be at least as good as the desired overall positional accuracy required for spatial data.

  Should be as evenly distributed throughout the data area.

- Sources

  Traditional transit and distance survey

  GPS measurements, existing cartometric quality map, existing digital data layers

Affine transformation

- Employs linear equations to calculate map coordinates

  $E = T_E + a_1x + a_2y$

  $N = T_N + b_1x + b_2y$

- Statistical fit: minimizes the root mean square error (RMSE)

  RMSE = $\sqrt{\frac{e_1^2 + e_2^2 + \ldots + e_n^2}{n}}$

  e = $\sqrt{(x_t - x_d)^2 + (y_t - y_d)^2}$

RMSE

- Usually less than true transformation error
- Not useful when comparing among different models
- Jackknife approach

Map projection vs. transformation

- Map transformation: statistically-fit linear equation
- Map projection: analytical, formula-based conversion

Metadata

- Data documentation: Information about spatial data
- It describes the content, source, lineage, methods, developer, coordinate system, extent, structure, and spatial accuracy.
- Standard: Federal Geographic Data Committee (FGDC) has defined a Content Standard for Digital Geospatial Metadata (CSDGM)1