Geol 588
- GIS for Geoscientists II
Today

- Some more raster concepts
- Image/Raster manipulation via Python (experimental)
- Start working on HW 1 (WebCT, due next Tuesday)
- MGIS Chapter 15 worked OK?
Features as raster

- Features lose uniqueness with raster representation
  (a line becomes a collection of cells, not one feature)
Raster coordinate systems

Matrix
- Cells located by row/column position
- Origin at upper-left
- Rows and columns always perpendicular

Cartesian
- Cells located by x,y
- May register to a map projection
- Used in ArcMap
**Raster resolution**

- **Rasters always generalize spatial data**
  - A function of cell size (smaller cells = higher resolution)
  - Impacts accuracy, processing speed, storage space

<table>
<thead>
<tr>
<th>Cell size</th>
<th>Matrix</th>
<th>Lake Cells</th>
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</thead>
<tbody>
<tr>
<td>100m</td>
<td>16 x 16</td>
<td>68</td>
</tr>
<tr>
<td>200m</td>
<td>5 x 5</td>
<td>10</td>
</tr>
<tr>
<td>400m</td>
<td>4 x 4</td>
<td>9</td>
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Raster cell values

- Raster cell values

- Integer or floating point — depends on raster format
  - ESRI grid, TIF, 1MG, and
  - ER Mapper support both
  - See help for details

- Integer: Discrete data
  (like land use and vegetation)

- Floating point: Continuous data
  (like distance and rainfall)

- NoData: Special flag value
  - Indicates no measurement for a cell
  - Numeric value varies with format

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<thead>
<tr>
<th></th>
<th>Integer</th>
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<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
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<td>1</td>
<td>1</td>
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Vegetation
0 = Rock
1 = Forest
2 = Water

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Rainfall
(inches)

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Raster attribute tables

- All single-band, integer rasters have “virtual” tables
- Created on-the-fly by ArcGIS
- Support ArcMap joins and relates
- Integer ESRI grids have real tables
- Support ArcMap joins and relates
- Support user-defined fields
- Use fields in analysis and queries
Control how an output raster is created

- Set for geoprocessing and Spatial Analyst toolbar — independent
Setting the output cell size

- Rasters are resampled during analysis
  - Combine rasters with different cell sizes, output another size

- Output options:
  - Maximum of inputs (default)
  - Minimum of inputs
  - Same as layer
  - As specified
Setting the output extent

- **Controls the width and height of the output raster**
  - Combine rasters with different extents, output another extent

- **Output options:**
  - Union of inputs (default)
  - Intersection of inputs
  - Same as layer
  - Same as display
  - As specified
Setting the analysis mask

- Defines areas where analysis is performed
  - Useful for clipping to irregular shapes

- Vector mask
  - Only cells covered by features are output (others set to NoData)
  - Create a feature mask with selection and export

- Raster mask
  - Only cells covered by valued cells are output (others set to NoData)
  - Create a raster mask with several Spatial Analyst techniques
Python Exercise

- copy geol588/data/588_python_img_exercises to your folder (E:)
- on python code (.py), snake-icon: right-click - Edit with Idle)
- **Idle**: editor window (write code), shell window (output)
- **Run code**: click on editor, Press **F5** (yes to save)
- will print output into shell window
- Abort (“hanging”): Press Control-F6
- Let’s look at `1_show_raster_true_elev_in_ft.py`