

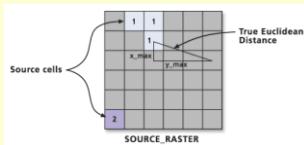
Topic 5:

Raster Data Analysis

Chang: Chapter 12
(DeMers: Chapters 9 & 12)

Raster "Buffer" Operations

- Input raster or vector layer
 - point, line, or poly
- Output is continuous distance raster
 - euclidean distance; continuous raster
- Output often reclassified into zones
 - results in thematic raster



1	1			
	1			
2				

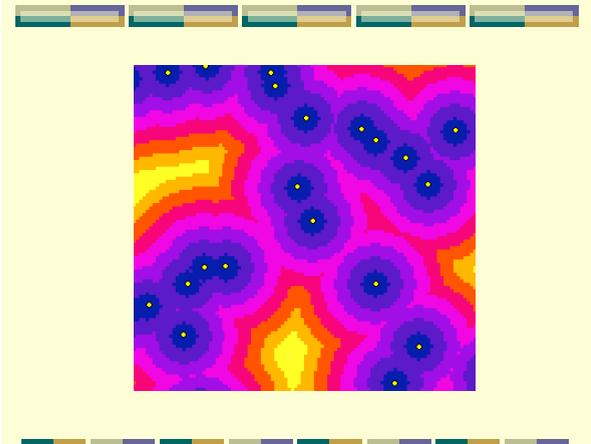
Source_Ras

=

1.0	0.0	0.0	1.0	2.0	3.0
1.4	1.0	0.0	1.0	2.0	3.0
2.2	1.4	1.0	1.4	2.2	3.2
2.0	2.2	2.0	2.2	2.8	3.6
1.0	1.4	2.2	3.2	3.8	4.2
0.0	1.0	2.0	3.0	4.0	5.0

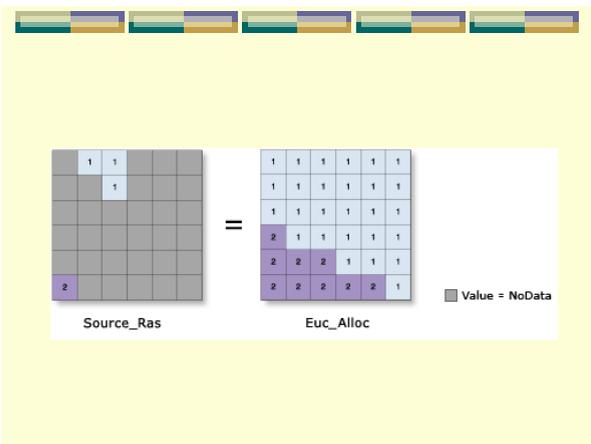
Euc_Dist

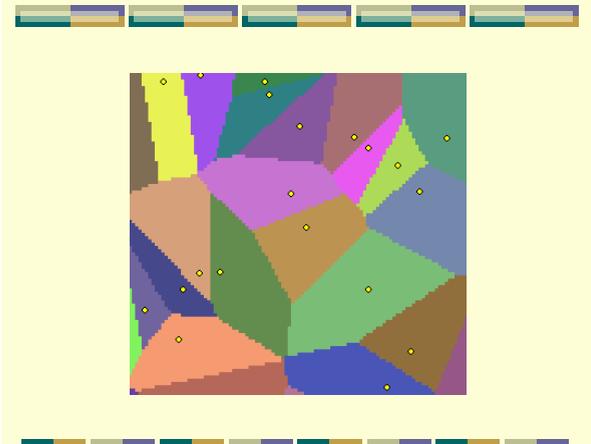
Value - NoData



Raster Allocation

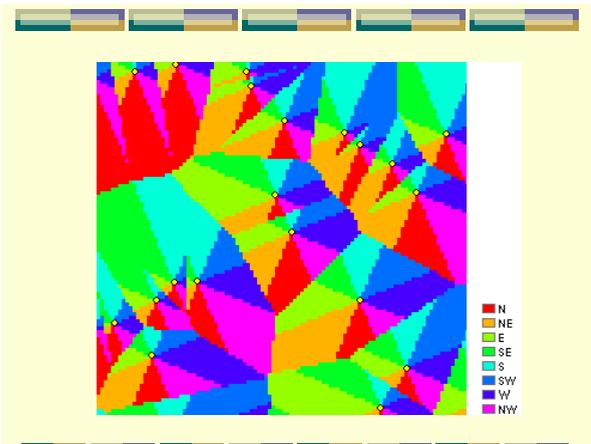
- Can input raster or vector layer
- Output is thematic raster, cell value is identity of nearest input feature
 - based on euclidean distance

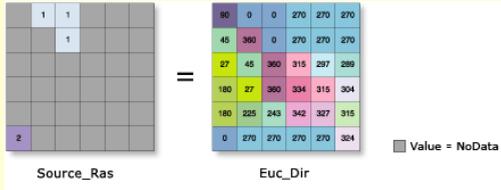




Raster Direction

- Can input raster or vector layers
- Output is thematic raster, cell value is identity of nearest input feature
 - euclidean distance





Raster Overlay Operations

- Performed using raster calculator:
 - relational, boolean, and mathematical operators
- May include one or multiple input rasters
- Operates on values of grid cells (integer or float)
 - Not records of an attribute table
 - NO intersection of feature geometry required



Raster Calculator Output

- For mathematical operations
 - Output grid layer:
 - Contains mathematical result of operation
 - Float type data values
- For conditional statements based on boolean logic and relational algebra
 - Output grid layer:
 - Consists of boolean or binary layer
 - Cell value 1 = yes, criteria satisfied
 - Cell value 0 = no, criteria not satisfied



Analysis Environment

Raster analysis options:

- Working directory
 - for output
- Analysis mask
 - excludes areas from analysis (e.g. water)
- Analysis extent
 - limits extents of analysis
- Cell size of output
 - determines output resolution

Raster Data Analysis

All raster data analysis functions can be categorized into:

- Local Operations
- Focal Operations
- Zonal Operations
- Global Operations

Type depends on:

1. whether or not adjacent grid cell values are considered when determining new cell value
2. whether fcn operates across a single layer, or on a per cell basis on a single or multiple layers

Local Functions

- One or more inputs
- Processed on a cell-by-cell basis
- Value of adjacent grid cells not considered

Focal Operations

- Output grid cell value based on value of adjacent (“neighbouring”) grid cells
- Neighbourhood defines size/shape of roving window or kernel
- Focal pixel is grid cell for which new cell value is being calculated

Focal Operations

- Neighbourhood can be:
 - rectangle
 - circle
 - annulus
 - wedge
 - of any user defined size



Focal Operations

- E.g.
 - focal sum = 110
 - focal mean = 12.22
 - focal std = 9.39
 - focal min = 0
 - focal max = 30
 - focal majority = 10
 - focal minority = 0
 - focal variety = 5

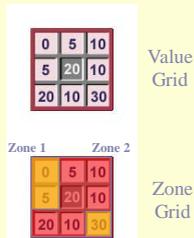
0	5	10
5	20	10
20	10	30

Zonal Functions

- Cells within a specific area or zone are treated the same
- Zones may or may not be contiguous
- Zonal functions require:
 - input grid – e.g. DEM
 - input zone layer (poly or grid)

Zonal Functions

- E.g. Zone 1, Zone 2
 - zonal sum = 35, 75
 - zonal mean = 11.67, 12.5
 - zonal std = 16.07, 6.12
 - zonal min = 0, 5
 - zonal max = 30, 20
 - zonal variety = 3, 4



Global or Extended Neighbourhood Functions

- Functions where output value of each cell is dependant on cell values across entire grid
- Functions include:
 - accumulated distance
 - accumulated cost
 - other surface, hydrologic, and groundwater functions

Other Raster Analysis

- Interpolation functions and surface analysis functions that create new raster layers are dealt with in the next topic

Raster Demo
