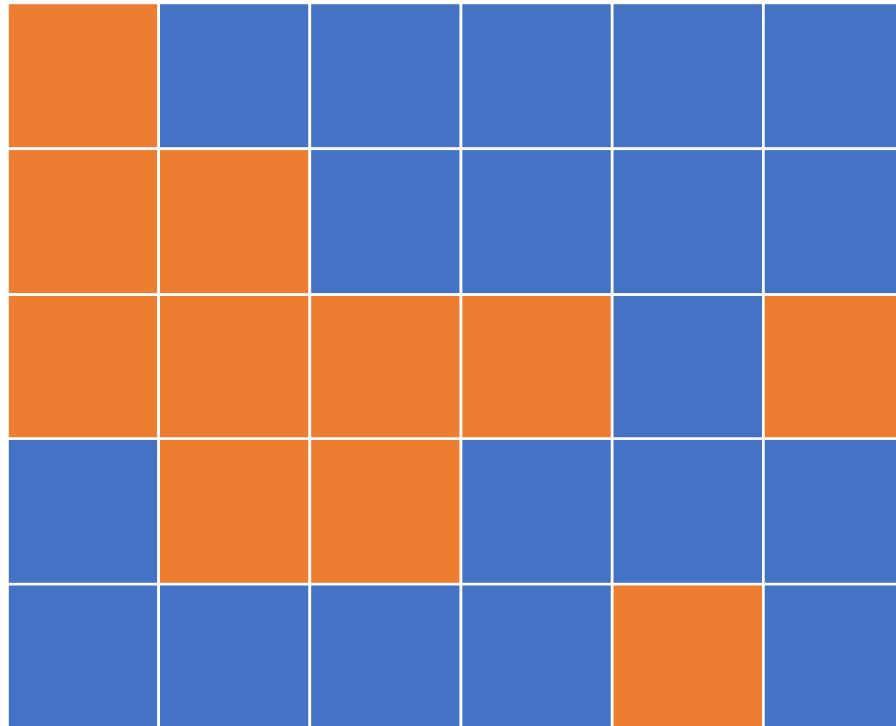


Principles of Spatial Analysis

SHORT LECTURE 01, WEEK 07: RASTER DATA



vector data

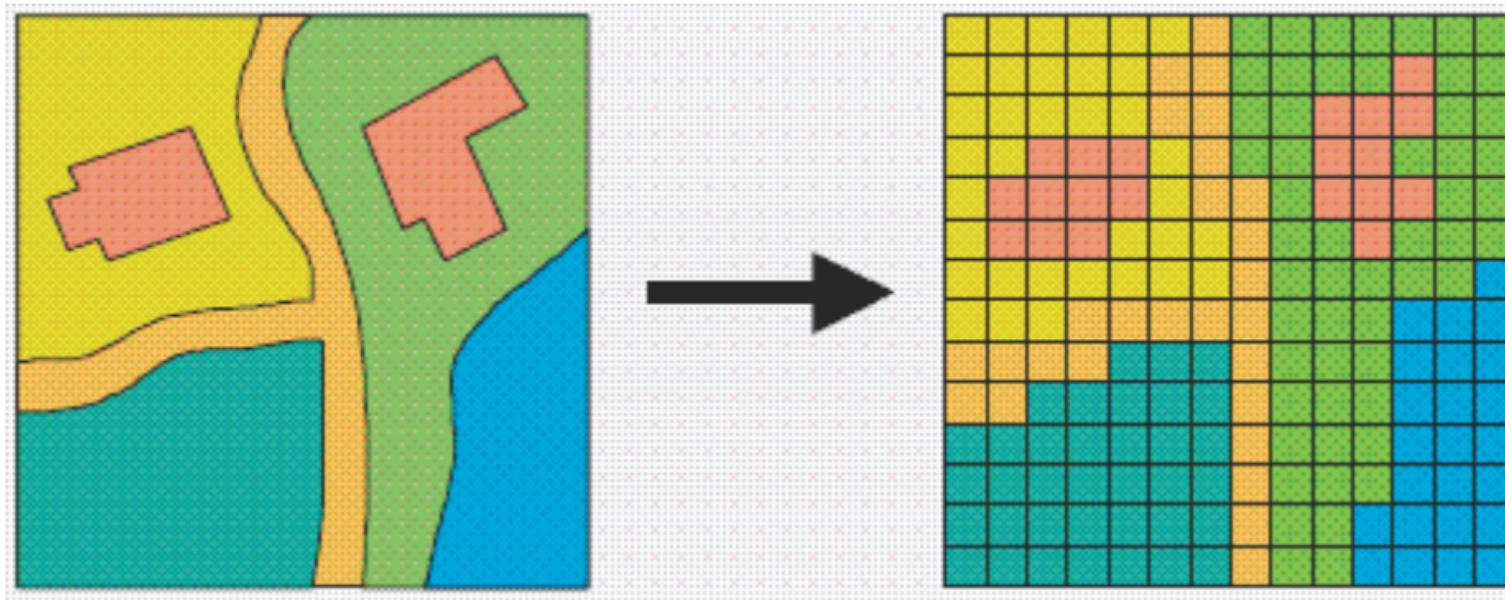
with vector-specific functions and operations

raster data

with raster-specific functions and operations

very common in environmental applications

where every location has one value (e.g. height, land cover, rainfall, sunshine hours)



categorical (number represent category)



continuous (numerical value of data)

1	0	0	0	0	0
1	1	0	0	0	0
1	1	1	1	0	1
0	1	1	0	0	0
0	0	0	0	1	0

basic raster

operations and functions

local, focal, zonal, and global

local operations and functions

are applied to each individual cell and only involve those cells sharing the same location

map algebra

mathematical, logical comparison, and boolean

1	0	0	0	0	0
1	1	0	0	0	0
1	1	1	1	0	1
0	1	1	0	0	0
0	0	0	0	1	0

multiplication * 2

2	0	0	0	0	0
2	2	0	0	0	0
2	2	2	2	0	2
0	2	2	0	0	0
0	0	0	0	2	0

1	0	0	0	0	0
1	1	0	0	0	0
1	1	1	1	0	1
0	1	1	0	0	0
0	0	0	0	1	0

1	0	0	0	0	0
1	2	0	0	0	0
1	2	1	1	0	1
0	2	1	0	0	0
0	0	0	0	1	0

addition

1	0	0	0	0	0
1	3	0	0	0	0
1	3	1	1	0	1
0	3	1	0	0	0
0	0	0	0	1	0

1	0	0	0	0	0
1	2	0	0	0	0
1	2	1	1	0	1
0	2	1	0	0	0
0	0	0	0	1	0

logical

0	0	0	0	0	0
0	2	0	0	0	0
0	2	0	0	0	0
0	2	0	0	0	0
0	0	0	0	0	0

1	0	0	0	0	0
1	1	0	0	0	0
1	1	1	1	0	1
0	1	1	0	0	0
0	0	0	0	1	0

1	0	0	0	0	0
1	2	0	0	0	0
1	2	1	1	0	1
0	2	1	0	0	0
0	0	0	0	1	0

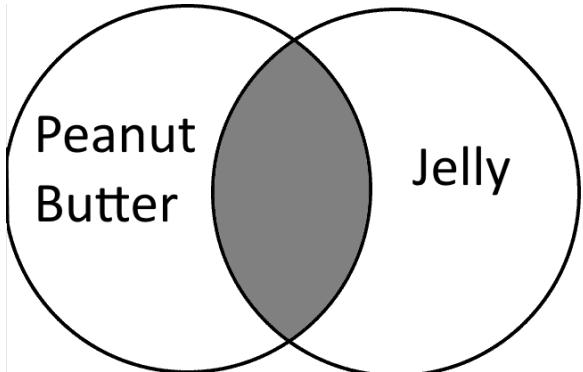
Boolean AND

1	1	1	1	1	1
1	0	1	1	1	1
1	0	1	1	1	1
1	0	1	1	1	1
1	1	1	1	1	1

Boolean operators

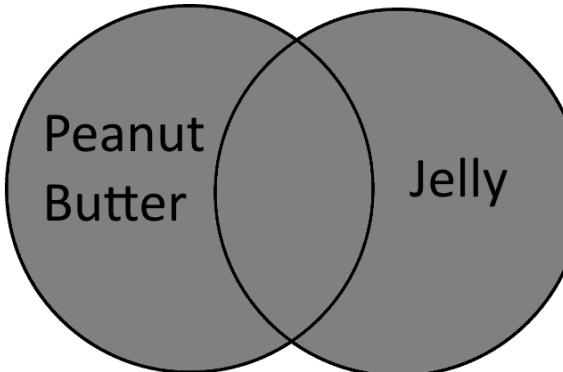
AND, OR, NOT, XOR

Truth evaluation using Boolean operators



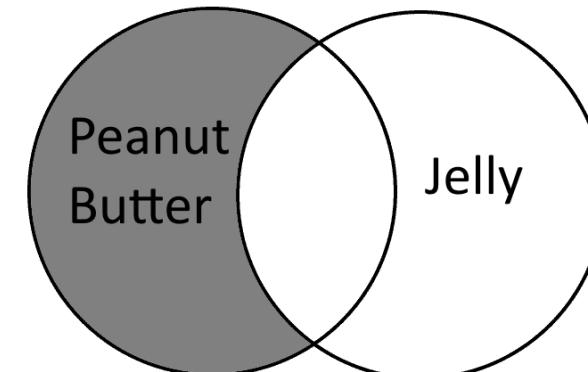
AND

Using AND, this search would only retrieve results with Peanut Butter and Jelly.



OR

Using OR, this search would retrieve results with peanut butter, with jelly, and with both.



NOT

Using NOT, this search would retrieve results with peanut butter, and exclude those with jelly or PB with jelly.

focal operations and functions

assign to the output cells some summary value of the neighbouring cells

1	0	0	0	0	0
1	2	0	0	0	0
1	2	1	1	0	1
0	2	1	0	0	0
0	0	0	0	1	0

focal (sum)

3	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

1	0	0	0	0	0
1	2	0	0	0	0
1	2	1	1	0	1
0	2	1	0	0	0
0	0	0	0	1	0

focal (sum)

3	0	0	0	0	0
6	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

1	0	0	0	0	0	0
1	2	0	0	0	0	0
1	2	1	1	0	0	1
0	2	1	0	0	0	0
0	0	0	0	1	0	0

focal (sum)

3	0	0	0	0	0
6	0	0	0	0	0
0	0	9	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

zonal operations and functions

computes a new summary value from aggregated cells

1	0	0	0	0	0
1	1	0	0	0	0
1	1	1	1	0	1
0	1	1	0	0	0
0	0	0	0	1	0

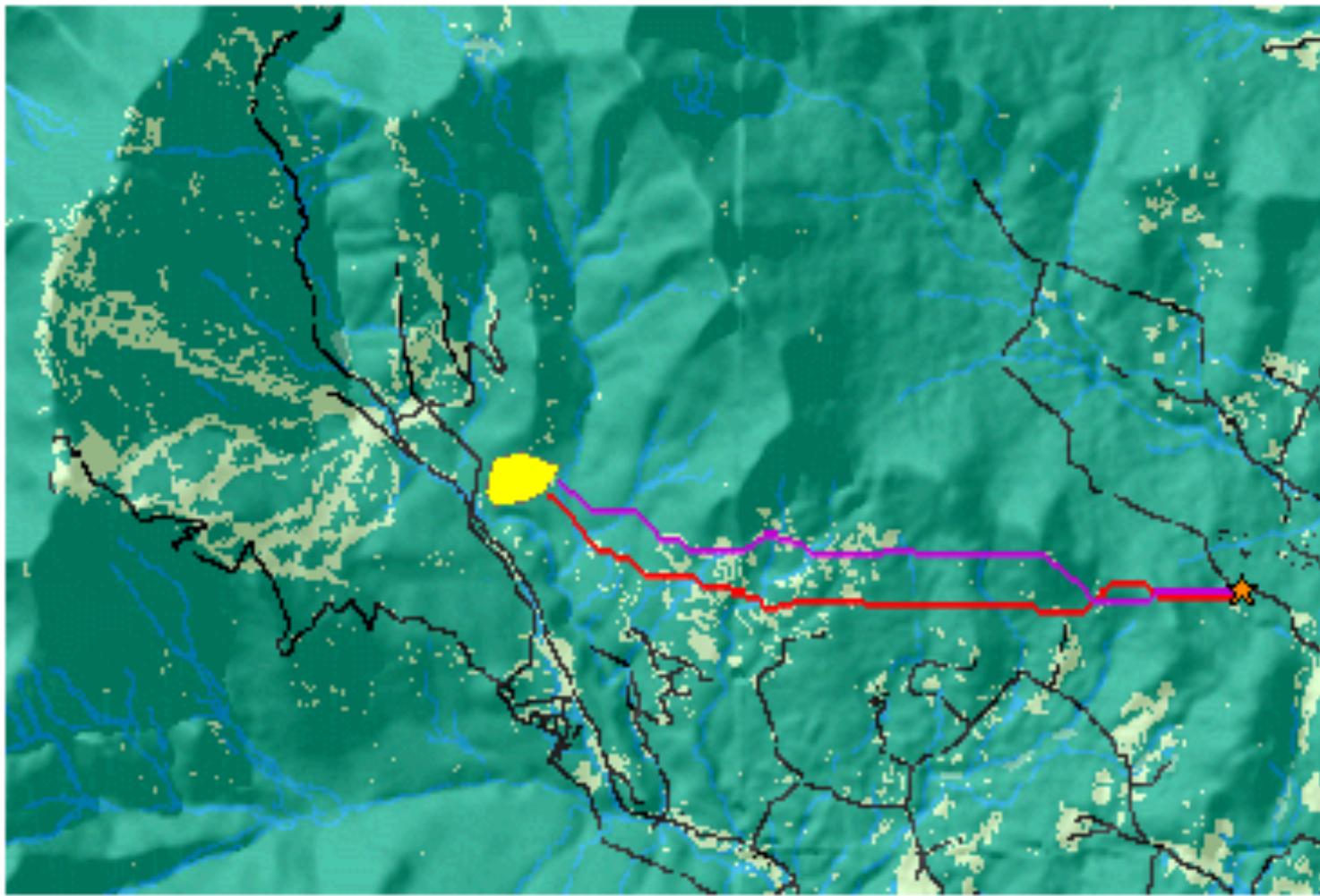
1	0	0	0	0	0
1	2	0	0	0	0
1	2	1	1	0	1
0	2	1	0	0	0
0	0	0	0	1	0

zonal

11	11	11	0	0	0
11	11	11	0	0	0
11	11	11	3	3	3
11	11	11	3	3	3
11	11	11	3	3	3

global operations and functions

may make use of some or all input cells when computing an output cell



least cost path (e.g. height/slope for modeling water flow)

let's put it into practice