

GEOLOG 452/552

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GIS for Geoscientists I

Lecture 11 - chapter 5

1

- Review (voting) on SQL queries
- Finish Ch 5 - Spatial queries (Select by location)
- If time: look at some (old) mini project 1 maps
- copy the folder
data\follow_along\ch5B_class_ex into to your student folder, open the mxd file

2

Which is SQL statement would select the name Jackson (in a Shapefile)?
(What does _ mean? What does % mean?)

“NAME” = “Jackso_”

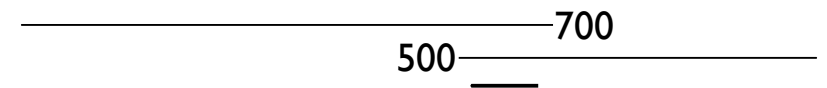
“NAME” LIKE “%son”

“NAME” LIKE “Jack_”

“NAME” = “%son”

3

Which selects “cities with 500 to 700 people”?



“POP” > 500
AND < 700

“POP” > 500 OR
“POP” < 700

“POP” > 500
OR < 700

“POP” > 500 AND
“POP” < 700

4

In this database Join, which is statement is **wrong** ?

Click on States to start the joining operation

Counties (3400 features)

States (50 features)

Shape*	NAME	STATE_NAME	S
Polygon	Lake of the Woods	Minnesota	27
Polygon	Ferry	Washington	55
Polygon	Stevens	Washington	42
Polygon	Okanogan	Washington	35
Polygon	Pend Oreille	Washington	35
Polygon	Boundary	Idaho	1E
Polygon	Lincoln	Montana	3C
Polygon	Flathead	Montana	3C

STATE_NAME	STATE_ABBR	POP1990
Hawaii	HI	1108229
Washington	WA	4866693
Montana	MT	799068
Maine	ME	1227926
North Dakota	ND	638800
South Dakota	SD	696004
Wyoming	WY	453588
Wisconsin	WI	4891763

Click on Counties to start the joining operation

Joined table will have 3400 features

STATE_NAME is the **key** field for joining here

Selecting by location

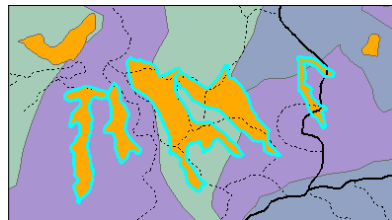
• The spatial operators test relationships between two layers at a time.

–The target layer is the one containing the features to be **selected**

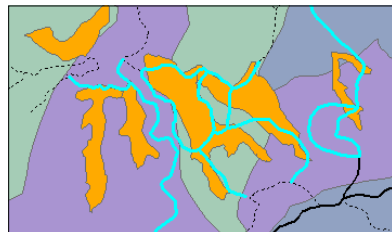
–The source layer is the one containing the features being compared to.

–Do not confuse these with destination/source concepts from Joining!

Select the outcrop polygons (orange) that are intersected by roads (black).



Select the roads that are intersected by outcrop polygons.



Spatial operators

- Spatial queries can employ a number of operators to test the basic conditions of:
- intersection (green)
- proximity (distance) (red)
- containment
- (Ignore 3D and Clementini operators for now)

With earlier selection - rivers within one state:

Select By Location

Lets you select features from one or more layers based on where they are in relation to the features in another layer.

I want to:

select features from

the following layers:

Interstates

Rivers

Urban Areas

that:

intersect

the features in this layer:

States

Use selected features (1 features selected)

Apply a buffer to the features in States

of: 50.000000 Miles

State was first selected (manually/SQL)

Manual or SQL selection - then spatial sub selection

9

SQL query after spatial selection

Select By Attributes

Layer: Cities

Method: Select from current selection

Fields:

"TYPE"	=	<>	Like
"CAPITAL"	>	>=	And
"ELEVATION"	<	<=	Or
"POP1990"	-	%	Not
"HOUSEHOLDS"		()	
"MALES"			
"FEMALES"			
"WHITE"			
"BLACK"			
"AMERI_ES"			

Unique sample values:

10040
10069
10152
10155
10201
10278
10317
10328
10550

SQL Info... Complete List

SELECT * FROM cities WHERE:

"POP1990" > 500000

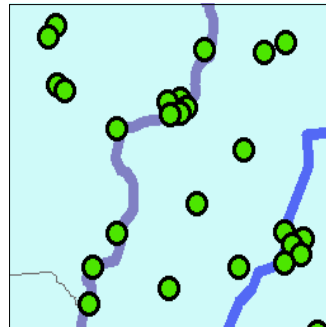
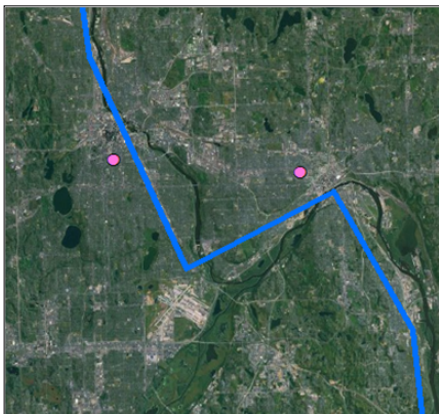
Cities within 50mi of earthquakes

Having > 500,000 people

10

Scale and accuracy issues

- When testing spatial relationships, consider that features are often generalized when created



Consider selecting cities that lie on (intersect) rivers.

A single point or line cannot adequately represent location at this scale. Selection becomes a hit or miss affair.

Use a buffers distance to allow a little room for error (points)

11

Proximity (distance) operators

intersect

are within a distance of

contain

completely contain

contain (Clementini)

are within

are completely within

are within (Clementini)

are identical to

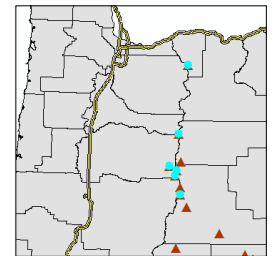
touch the boundary of

share a line segment with

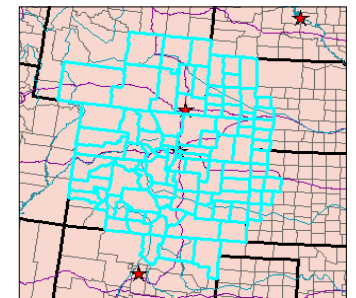
are crossed by the outline of

have their centroid in

Volcanoes within 100 km of an interstate



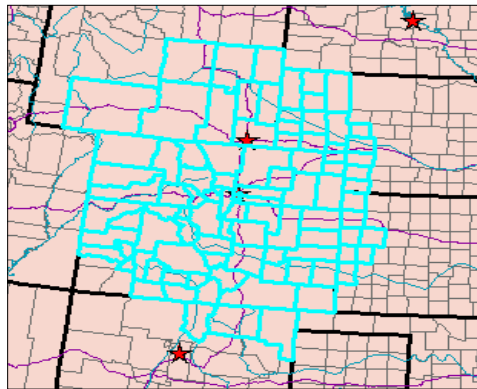
Counties that are within 200 miles of Denver (Target: Cities -> select Denver)



12

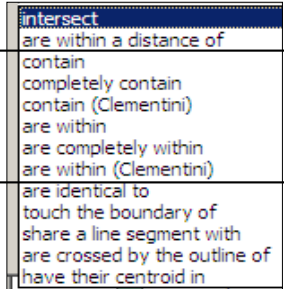
Proximity (within distance) exercise

- Which >100,000 people cities are within 30 miles of an earthquake of Magnitude > 7.0
- definition query for:
cities POP2010 > 100000
earthquakes MAG > 7.0
- Use selected features, save selection in new layer (
- optional: Which state has the most of these cities?



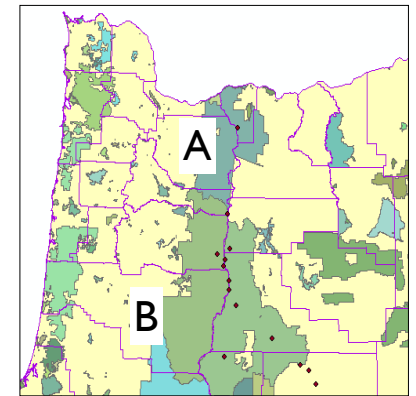
- Select Counties within 200 miles of Denver?
- To Select Denver:
 - A) Manually - make Counties the only selectable layer first or
 - B) Select by Attribute: SQL query: _____
- Optional: How many of these Counties does each state have?

Containment operators

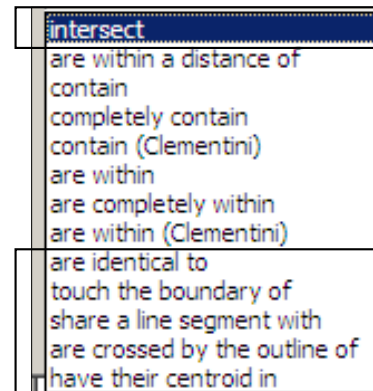


- Features that enclose all of another feature **contain** it.
- **Within** is the inverse of **contain**

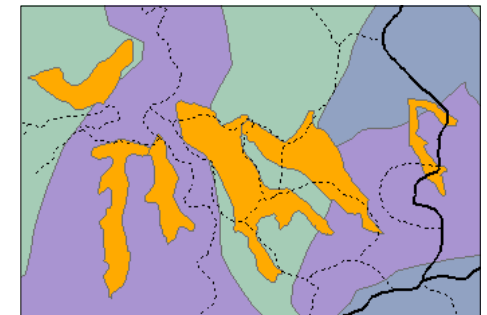
- Contains
 - One feature lies inside another and may share a boundary
 - Oregon contains county B
- Completely contains
 - One feature lies inside another without touching the boundary
 - Oregon does NOT completely contain County B, but Oregon does completely contain County A



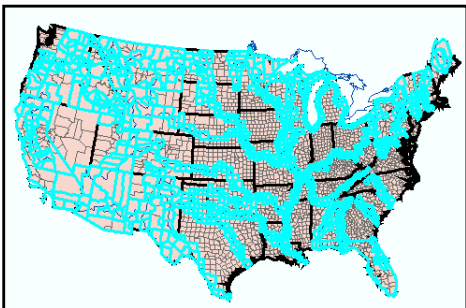
Intersection operators



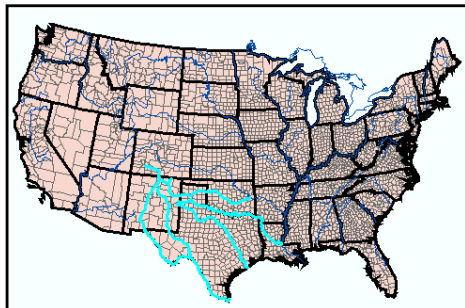
- Features intersect when any part of one feature touches, crosses, or overlaps another feature.



↑
“special cases” of intersecting features.



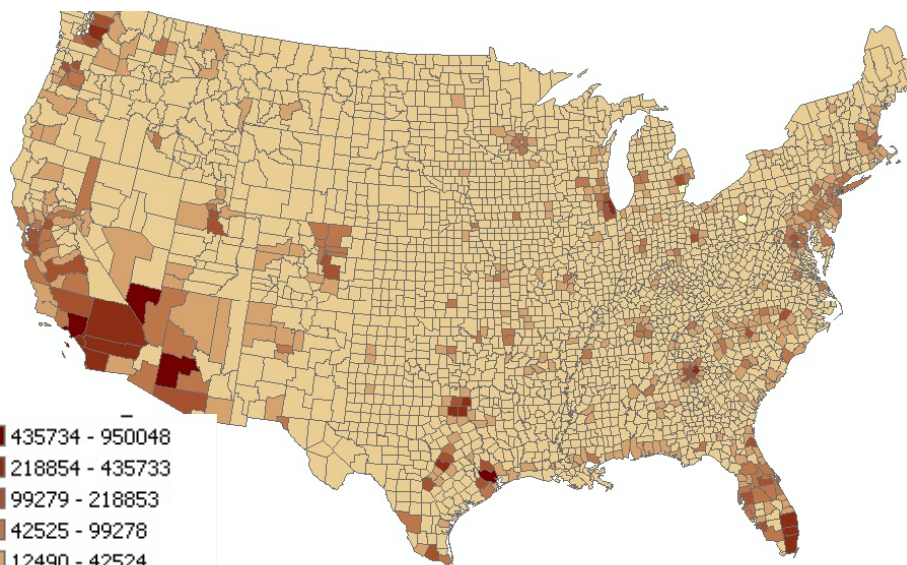
Select counties (polygons) that intersect rivers (lines)



Select rivers (line) that intersect the state (polygon) of Texas (states: polygons with fat outline)

Mini-project I Maps

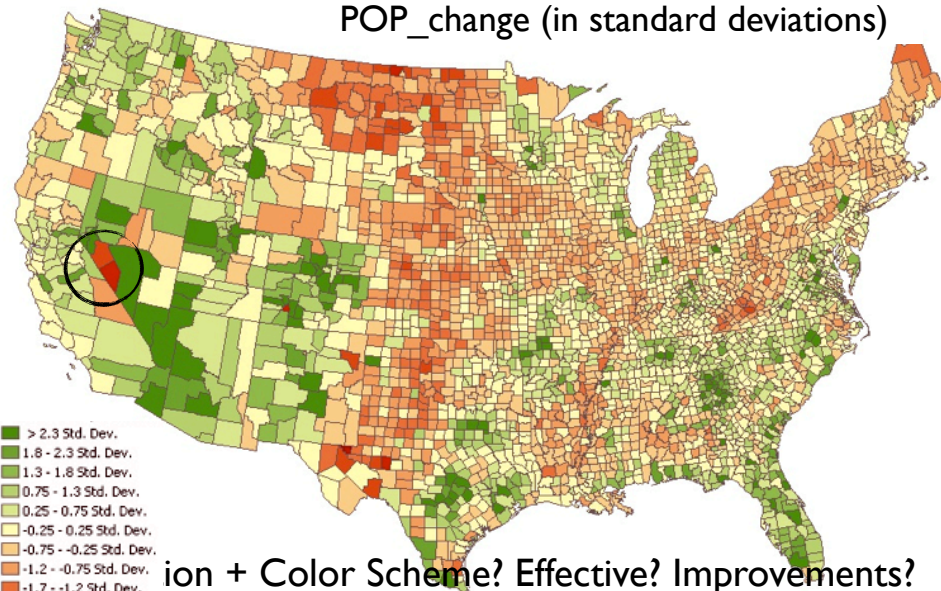
- Here are some maps about **population change** from the last years
- show population change in absolute numbers or % or standard deviations (sigmas)
- Let's analyze the classification scheme and the color strategy
- Is this effective? Do you quickly get the gist? Does it look good?



435734 - 950048
218854 - 435733
99279 - 218853
42525 - 99278
12490 - 42524
-26825 - 12489
-84860 - -26826

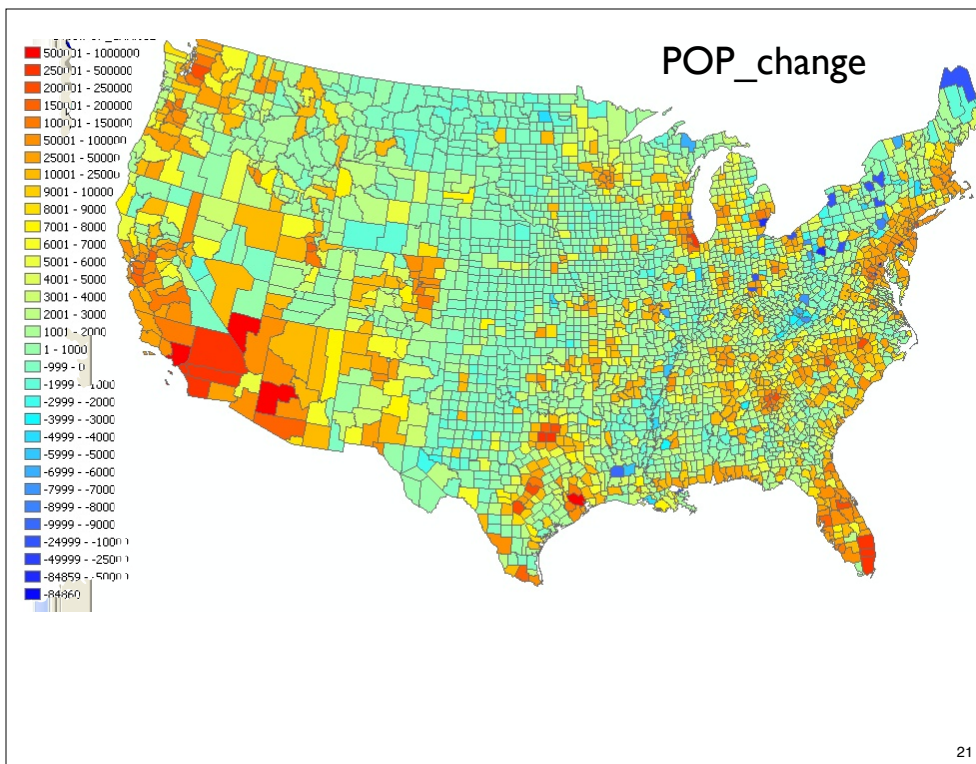
Color Scheme? Effective? Improvements?
Absolute POP change

POP_change (in standard deviations)



> 2.3 Std. Dev.
1.8 - 2.3 Std. Dev.
1.3 - 1.8 Std. Dev.
0.75 - 1.3 Std. Dev.
0.25 - 0.75 Std. Dev.
-0.25 - 0.25 Std. Dev.
-0.75 - -0.25 Std. Dev.
-1.2 - -0.75 Std. Dev.
-1.7 - -1.2 Std. Dev.
-2.2 - -1.7 Std. Dev.
-2.8 - -2.2 Std. Dev.
< -2.8 Std. Dev.

Color Scheme? Effective? Improvements?



Lab

- HW 6: ch5: 1,2,4,5 and 7 (extra: 3 and 10)
- Tut: ch 5, 20 to 40
- Next week: Spatial Joins (Ch 6)
- next-next week:
 - Midterm preparation (think about questions for review session)
 - Start with mini project 2