• Chapter 6: Spatial joins
• Theory of spatial joins
• look at all four possible join cases
• Any issues with HW 5 or 6?
• Tut ch 6: all
• HW 7: ch 6. ex 1, 3, 4, 5,
Spatial joins

• Don’t confuse it with spatial query!

• Use location (spatial) criterion, not common field (key), to connect features

• Ex: for each city feature, append data from the county feature the city is inside.

• Creates new data file (permanent data layer), no “remove spatial join”

• There’s no spatial relate
Source layer – destination layer

- Make the (new, better) city layer “smarter” by adding the name of the county the city is inside of (Ames - inside Story county)
- The destination is the city layer (which becomes smarter)
- The source is the county layer (which delivers the add-on info)
- Destination layer (the one you right-click – join) determines data type of join (point destination > point joined layer, etc.)
- make sure to select “... based on spatial location” in Layer - Join Data dialog! (don’t database join!)
- Destination will have (something of) the source table appended
Spatial joins: Four cases (p. 244, fig 6.5)

- **Simple join**
  - **Many-to-One Relationship**
  - **One-to-One Relationship**

- **Summarized join**
  - **One-to-Many Relationship**
  - **Many-to-Many Relationship**

**Inside**
- Destination Table
- Source Table

**Distance**
- Destination Table
- Source Table
Inside

Simple

Hospitals ← Counties

Which county is each hospital in?
____ to ____

Distance

Hotels ← Attractions

Which attraction is closest to each hotel? How far is it?
____ to ____

Summarized

Counties ← Hospitals

How many hospitals in each of the counties?
____ to ____

Hotels ← Attractions

How many attractions are closest to each hotel?
____ to ____
Join each well (points) record to the record of the geologic rock (polygon) that it falls inside.

Type of join? __________
Dest.: __________
Source: __________
What is the distance of each county to “its” closest hospital?

Type of join? ________

Dest.: ___________ Source: __________

Each county features gets name of closest hospital and the distance (colored by distance)
How many cities in(side) each county?
(How many people live in each county’s cities?)

Type of join? ___________ Card.? __ - __

Dest.: _____ Source: _______
Count field is always generated automatically. For optional statistic (e.g. sum) each numerical source field is summarized (SUM_POP, rq5)

<table>
<thead>
<tr>
<th>Shape</th>
<th>FID_1</th>
<th>NAME</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>Campbell</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>Harding</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>McPherson</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Perkins</td>
<td>72</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Corson</td>
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</tr>
<tr>
<td>5</td>
<td>5</td>
<td>Brown</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>Marshall</td>
<td>40</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>Roberts</td>
<td>88</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>Walworth</td>
<td>7</td>
</tr>
</tbody>
</table>

Yes, it’s me, Count von Underscore (again)
Develop a pollution risk index for rivers based on the total number of people in the adjacent counties.

Type of join? __________ Card.? __-__
Dest.: _____ Source: _____
• Follow along: copy data/follow along/ch6A_class_ex into you student folder

• Ch6a_class_ex.spatial_join.mxd

• Save the newly made spatial joins as shapefiles in your folder

• name them well (e.g. county_hosp_join.shp)
Right-click on **destination** layer (!)
Set Join type to spatial
Choose source table
Choose join type
Specify output file
Based on the two geometries and the destination ArcMap picks the possible two join types.

You just need to pick the right one.

These 2 choices (A, B) vary per dest./source type

Usually one is simple and one is summarized.

Read the text for key words that give away which of the four cases from p. 224 you will get!
Simple inside join (p. 224, upper left)

• Each hospital is in which county?

• Each of the \textit{(many)} hospitals (destination) is inside \textbf{exactly one} county (source)

• M-1 cardinality

• Two types: for each point get polygon that: A) it falls inside or B) it its closest to

• Destination? \underline{___________} Join Type? \underline{______}

• Appends county (COUNTY) to hospitals

• Hospitals: Show labels (COUNTY), zoom in
Summarized inside join (p. 224, upper right)

- Each county has how many hospitals?
- 1-M cardinality - Every one county has many hospitals
- For each county append
  - A) **Summary** + number (count) of the numerical hospital fields
  - B) The fields of the one hospital that’s closest (instead of polygon think river)
- Destination? _________ Let’s do type A - summary/count
- Color by COUNT_ (number of hospitals)
Simple distance join (p. 224, lower left)

- 1-1 cardinality
- Operates on distance only!
- **For each** landfill well give me the **one** hospital well that is closest (plus it’s distance)
- Destination: ____________  Source: ____________
- Type: needs to be B) (look for closest in the text)
- Label landfills by: DISTANCE (last field)
- Which is the closest(____m) to any hospital? (Name Hospital_NAM of this hospital? )
Summarized distance join (p 224, lower right)

- M-M cardinality

- For each landfill find the sum of all nearby hospital beds

- Group the hospitals (by distance) around each landfill, for each group get sum of beds

- Destination: _________  Source: _________

- Type A): summary but based on closeness (Sum)

  Append summary of BEDS (SUM____) what’s the largest number of total beds? _____ where? _________

- Max. number of those hosp. closest to each landfill (in _________) is (But what does a 0 mean?)

- Color by Sum_BEDS
Wrap up

- Lab: CH 6 tut. 1-37
- HW 7: ch 6. ex 1, 3, 4, 5, 7, due Oct 15 (can start now)
- Stop and think: which of the four cases is it? (p. 249 is your friend!!)
- Next week (Oct 9): spatial join wrap up, mini project 2 start (mini proj 2 due Oct 20)
- Oct 13: Midterm prep (1 Question in WebCT Request for review discussion for each of you!)
- Oct 15: Midterm (20 min Mult. Ch. + 60 min practical)