

CEIE 410/510: GIS in Engineering, Fall 2009

Mohan Venigalla

OVERLAY



© Mohan Venigalla, Fall 2009

Overlay

Overlay

➤ Definition

- The process of overlapping different themes to compare variables among the themes

➤ Purpose

- To identify and study spatial correspondence among coverages
 - Casual relationships – only verbal explanation
 - Empirical relationships – mathematical models (i.e. related by numbers)



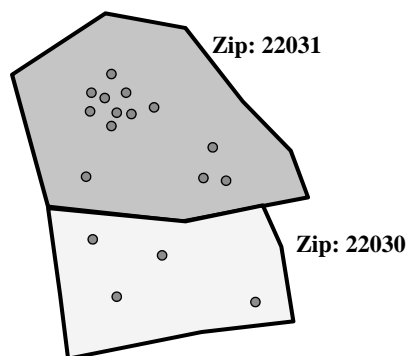
© Mohan Venigalla, Fall 2009

Overlay

Point-in-Polygon

- Overlay of point objects in a polygon
- Can call it: "Pin-Mapping"
- Often gives a visual "feel" for spatial relationship!

A Hypothetical Example:
No. of Violent Crimes



© Mohan Venigalla, Fall 2009

Overlay

Line(s)-in-Polygon

- Visual "feel" for hypothesis
- Does TN has more Interstate Highways (miles) than KY?
- ❖ "Large" Urban Areas Develop at Interstate Junctions (or just the opposite?)
- ❖ Analytical Need



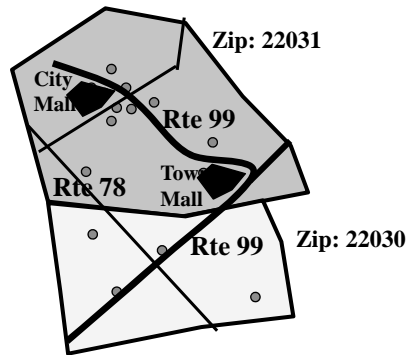
© Mohan Venigalla, Fall 2009

Overlay

Points & Lines in Polygon

➤ Is there more crime A Hypothetical Example:
 along Rte 99 than
 Rte 78?
 No. of Violent Crimes

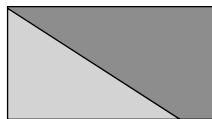
➤ Does City Mall
 need more
 patrolling than
 Town Mall?



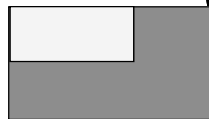
© Mohan Venigalla, Fall 2009

Overlay

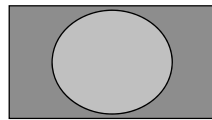
Polygon Overlay



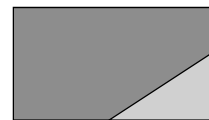
Protected Woods



Wetlands



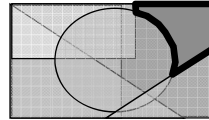
Defense Dept.



Commercial



Flood Zone



Land Parcel For Development

A Hypothetical Example:

Looking for Land to Develop a 150 unit Subdivision



© Mohan Venigalla, Fall 2009

Overlay

Query Based Overlay

➤ The RDBMS

- Allows for any combination of features to be displayed selectively!

If $xyz > pqr$ then

{ do this }

Else if $xyz < abc$ then

{ do that }

Else don't bother!

- Enables *mathematically based overlay*



© Mohan Venigalla, Fall 2009

Overlay

Raster Overlay

➤ Point-in-Polygon raster overlay operations are relatively simple:

- Lack of exact location information – no problem
- Can be very well automated

➤ Line-in-Polygon and polygon-on-polygon – similar operation!

➤ Numerical combination of existing coverages will be transformed in to new coverages

• Example:

0	1	1
1	0	0
1	1	1

0 = No Weeds
1 = Weeds

+

1	1	0
0	0	0
0	1	1

0 = No Grass
1 = Grass

=

1	2	1
1	0	0
1	2	2

New Coverage
0 = No Grass or Weeds
1 = Grass
2 = Grass & Weeds



© Mohan Venigalla, Fall 2009

Overlay

Vector Overlay

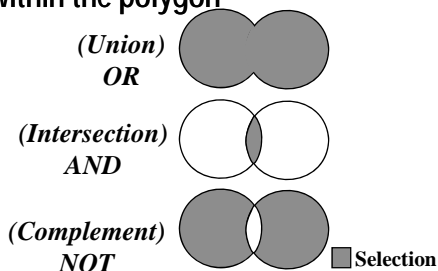
➤ An important cartographic process for map production!

➤ Main problems with L-i-P overlay

- Lines don't always contain within the polygon
 - Intersecting
 - Center within
 - Completely contained

➤ Poly-on-poly overlay

- Boolean Operations
 - AND, OR, XOR and NOT



© Mohan Venigalla, Fall 2009

Overlay

Other Overlay Topics

➤ CAD-Type overlay

- Import CAD drawing into GIS by employing some conversion

➤ Topological vector overlay

- Least common geographic unit (LCGU)

➤ Dasymetric mapping



© Mohan Venigalla, Fall 2009

Overlay