

Exercises for Spatial Databases and GIS

Sheet I (until 04.11.2016)

Exercise 1 (9-intersection model)

A simple line is a line with exactly two endpoints and any connection between them, e.g. straight line, arc, ogee, etc. A simple polygon is one polygon without any holes.

1. Draw two simple lines to exemplify the given 9-intersection matrices.

a)

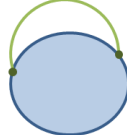
	I	B	E
I	1	1	1
B	1	1	0
E	1	0	1

b)

	I	B	E
I	0	0	1
B	0	1	1
E	1	1	1

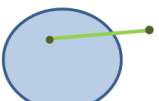
2. Write down the matrices for the topological relations between the drawn geometries.

a)



	I	B	E
I			
B			
E			

b)



	I	B	E
I			
B			
E			

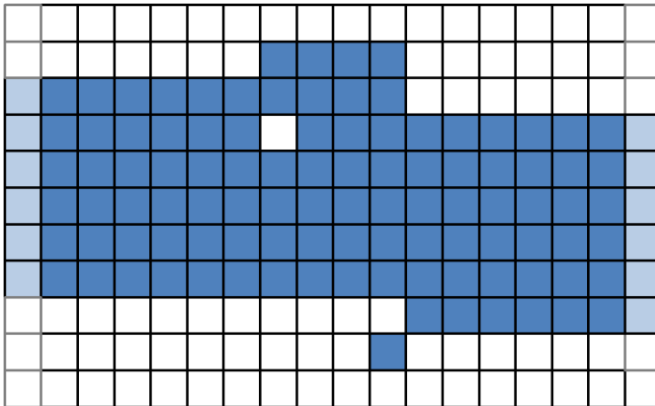
3. How many different topological relations are possible between the following geometries? Why?
 - a. two points
 - b. a point and a line
 - c. a point and a polygon
4. Can you think of topological relations, having the same 9i-matrix, although you might consider them to be different?

Exercise 2 (Rasterization)

1. How can you determine the raster-width you need to represent a given vector polygon accurately in that raster?
 - a. What is the complexity of the calculation of the raster-width?
 - b. Will it work for all polygons? Give examples of problematic polygons if they exist.

Exercise 3 (Centerline extraction)

1. Vectorize the dark blue part of the given line using topological thinning. The light blue pixels only show how the line continues.



2. If holes and stubbles consisting of only a few pixels are most probably faults, what could be used as preprocessing step to eliminate them?