

## Introduction to Geoinformatics – IFGI-Munster SS 2016

### Assignment #1 – An essay on “Topological Operations on 2D Space for Geographical Applications”

In this assignment, you will read first four papers describing three different methods for measuring topological relations between objects in 2D Space: Egenhofer on point-set topology (4- and 9-intersection model), Clementini on the calculus-based method (CBM), Cohn on the region-connected calculus (RCC). Then you will read one paper that compares these methods (Clementini comparing CBM with Egenhofer’s 4- and 9-intersection method). Note that the Cohn paper also has a comparison between the RCC and point-set topology.

Your assignment is to answer the following questions on the topic “Topological Operations on 2D Space for Geographical Applications”, using these papers as a basis. Please provide answer to the questions below. Each answer must be objective but not too concise.

1. Why is topology important for GIS?
2. Let  $A$  and  $B$  be any two extended entities separated by a common boundary (such as Germany and France). Which of the following views on the boundary of Germany and France has been adopted by each of Egenhofer, Cohn and Clementini? Justify your answer.
  - a) The boundary may belong neither to  $A$  nor to  $B$ .
  - b) The boundary must belong either to  $A$  or to  $B$ , though it may be indeterminate to which of  $A$  and  $B$  it belongs.
  - c) The boundary may belong both to  $A$  and to  $B$ , but the relevant overlap is *sui generis* precisely because boundaries do not *take up* space.
  - d) There really may be two boundaries, one belonging to  $A$  and one belonging to  $B$ , and these two boundaries are co-located.
3. What are the advantages of the 4-intersection and 9-intersection methods, as claimed by the authors?
4. What are the advantages of RCC compared to the 4- and 9-intersection method, as claimed by the authors of the RCC paper?
5. What are the advantages of the CBM (calculus-based method) relative to the 4- and 9-intersection ?
6. What method was adopted by the OGC for the standard simple feature operations?