**Topology Questions – “Thinking Like a GIS”**

This material is adapted from

Dawn Wright

Professor, Oregon State University and Chief Scientist of ESRI

<http://dusk.geo.orst.edu/index.html>

Topology allows a GIS to structure data based on the principles of maintaining **adjacency** or **connectivity** between vector features. These data structures are useful for detecting and correction digitizing errors. For example, if the result of digitizing a map results in two lines in a roads vector layer that do not meet perfectly at an intersection, then you can use topology rules to correct the problem. More importantly topology is *necessary* for certain kinds of spatial analysis such as network analysis and measurement. For example, you cannot find the best route across a road network if the intersections do not line up, and you cannot calculate the length of a river if the tributaries do not connect.

Lines are stored as **arcs**. Each arc starts and stops at a **node**. Because the arc starts and stops at a node, the arc has *direction*, defined by which node is the **from node** (FNODE) and which node is the **to node** (TONODE). **Consider the following sketch of arc-node topology, and fill out the table that follows (nodes are indicated by boxed numbers, arcs by unboxed numbers).**

A picture containing text, clock

Description automatically generated

|  |  |  |
| --- | --- | --- |
| **ARC** | **From Node** | **To Node** |
| **1** |  |  |
| **2** |  |  |
| **3** |  |  |
| **3** |  |  |
| **5** |  |  |
| **6** |  |  |
| **7** |  |  |
| **8** |  |  |

Arcs form the boundaries of polygons. The topology of a polygon coverage contains both an ID# for each arc and the identification of the polygon bounded on the right (RPOLY) and left (LPOLY) of the arc. **Consider the following sketch of polygon-arc topology, and fill out the table that follows (polygons are indicated by boxed numbers, arcs by unboxed numbers)**.

A picture containing text, clock

Description automatically generated

**Also, consider arc ID#1. How does this arc turn two corners without have nodes at these corners?? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |
| --- | --- | --- |
| **POLY** | **# of ARCS** | **ARCS** |
| **2** | **1** | **7** |
| **3** | **4** | **1, 4 ,5, 7** |
| **4** | **3** | **3, 4, 6** |
| **5** | **3** | **2, 6, 5** |

|  |  |  |
| --- | --- | --- |
| **ARC** | **Left POLY** | **Right POLY** |
| **1** | **1** | **3** |
| **2** |  |  |
| **3** |  |  |
| **4** |  |  |
| **5** |  |  |
| **6** |  |  |
| **7** |  |  |