Advanced GIS Applications in Urban Planning (URBP 608)
Fall 2011
McGill School of Urban Planning

Assignment 1: Basic Spatial Analysis

This assignment has two main goals: to review many of the vector-based geo-processing tools learned in previous GIS classes and to apply these tools to "real-world" questions with spatial dimensions and urban planning implications. This will require the use of most of the basic geo-processing tools (dissolve, intersect, buffer, clip) as well as table and spatial joins, basic queries, selecting by location and attributes, adding fields, and using the field calculator. You will also be required to begin to think about issues of scale, appropriate visualization of data and statistical tests.

Rather than providing a "step-by-step" guide, we would prefer that you—individually or in small groups—attempt to figure out the work flow and operations. Bear in mind that there are several ways this assignment can be solved.

Using the provided data, answer the following questions to the best of your capabilities, it is important to note that some of these questions may have more than one "correct" answer.

Part 1
For each census tract on the island of Montreal:

1) What is the percentage of the following land uses: Residential, Commercial, Parks, Government and Institutional, Open Area, Resource and Industrial, Waterbody?
    - The output of this step should be a .dbf with 522 observations and 8 columns labeled, 'ctuid', 'res_per', 'comm_per', 'park_per', 'inst_per', 'open_per', 'indust_per', 'water_per'.
2) How many metres of arterial roads? Local roads? Generate a thematic map showing the density of arterials in each census tract. Hints:
    - CARTO= 4=Arterial, CARTO=5=Local
    - You will need to use the "summarize" tool
3) How many:
    - Retail establishments?
    - Bus stops?
    - Different bus lines?
    - Join this information to the output of question 1 to generate a table with 3 additional columns
4) Which census tract has the most retail opportunities? Which has the most per area of census tract? per person?
    - Generate 2 maps, one with density by area, and one with density by population.
    - What are some potential issues with displaying information this way? What other information might be important? What information is lost?

Part 2

1) What is the estimated population of people living within 250 metres of a Metro station?
2) What is the median household income in these areas?
3) Which stop has the:
    - Highest and lowest population density?
    - Highest and lowest median household income?
    - Which metro *line* has the highest median household income around it?
    - Briefly explain how you calculated these values.

4) Is there a difference in population density or median household income in this area compared to the island as a whole? How might you test/confirm this?
5) **Optional:** Is there a statistically significant difference in population density or income among the different metro lines? How would you test this?

The output of Part 1 will be used again in a later in Assignment 3.