Geog 176A: Introduction to Geographic Information Science and Systems
Summer 2017

Lab 1: Location

Objectives

Through this lab, you will gain a deeper understanding of the concept of location by experimenting with location data and services. Location information is essential to GIS and will be used in the labs on all other concepts. In this first lab, you will learn how to find, use, produce, and transform location data. For additional support while working on this lab, please refer to the short chapter on location posted to GauchoSpace.

Provide a technical report as a single file uploaded in GauchoSpace with answers to the following questions **(18 points possible)**. Point values for each question are in parentheses. Use the following convention to name each of your lab assignment documents as a PDF to GauchoSpace: *LastnameFirstname_Lab1*.

Tasks

1. **Locate** yourself outdoors in two different ways (3 points total):
    a. Describe your localization in a way that a classmate could easily find you. Refer to landmarks around you based on what you can see (0.5). Distinguish between providing directions and describing a localization (0.5).
    b. Use a GPS app on a device like a smartphone or tablet, sharing a device with a friend if necessary. Report your latitude, longitude, and altitude along with their units (0.5). How are the values, particularly, altitude, calculated? (0.5)
    c. Report the "three necessary elements of location data" (from Kuhn) for each of your previous answers, referring to the chapter on location you read (1).

2. **Spatial relations** (3 points total): How far away and in what direction is a restaurant of your choice from your position stated in Question 1? Answer using three different spatial relations (3), stating the purpose of each description.

3. Describe what **location data** you would provide about the building in which you live, for the following purposes (2 points total):
    a. Marking your building on http://www.openstreetmap.org (0.5)
    b. Helping a visitor with a local paper map find your building (0.5)
    c. Finding the bus station closest to your building (0.5)
    d. Determining if the roof of your building is visible from the Santa Barbara Courthouse (0.5)

4. Give an example of each of the following kinds of **places** in Santa Barbara County. Locate each as *precisely* as you can and explain why each description is sufficient (3 points total):
    a. a mountain peak (1)
    b. a valley (1)
    c. an event where a concert is taking place (1)

5. Distinguish between **geocoding** an address and **reverse geocoding** (2 points total):
    a. **Geocoding:** Determine latitude and longitude in the WGS84 reference system from the postal address of the building in which you live, using http://www.mapdevelopers.com/geocode_tool.php (0.5). Concisely describe how this service works (0.5).
    b. **Reverse geocoding:** Compute an address for your position that you determined in Question 4b, using https://developers.google.com/maps/documentation/javascript/examples/geocoding-reverse (0.5). Concisely describe how this service works (0.5).

6. **Coordinate transformations** (5 points total)**:** Coordinate reference systems allow us to transform positions from one system to another.
    a. Compute *Plane Convergence* (1), *Longitude* in WGS84 (1) *Radial Difference* (1), and 4) *Latitude* in WGS84 (1) from the following California State Plane Coordinates of UCSB's Campus Point: (**0405 ,** 1830457.457mE , 601876.659mN). Use the formulas that start on *page 11-9* and the table constant values for CA Zone 5 on *page 11-42* found in http://www.dot.ca.gov/hq/row/landsurveys/LSITWorkbook/11.pdf. Show your calculations for each step taken to receive full credit (4).
    b. Convert the latitude and longitude from WGS84 to UTM Coordinates, using http://www.synnatschke.de/geo-tools/coordinate-converter.php (1).