GGR321 Group Project Instruction

Description

The goal of this project is to allow you to apply what you have learned from this course to real world GIS problem-solving. You should work in groups of 4-5 students. Every group needs to detail in a write-up of the members' contribution to the project as one slide in the presentation, and all students will participate in the presentation in order to count towards their grade. Your objectives are:

1. Developing an ArcMap tool (with Python programming) to solve a real-world GIS problem.
2. Implement your tool on a real-world spatial dataset.
3. Analyze the results of the spatial data processing with your developed ArcMap tool.

Project Ideas

In the appendix, we give one example project idea. Your group could work on this project idea. However, you are encouraged to choose to develop other real-world GIS problems that you are interested in.

If your team choose to work on your own real-world GIS problems with your spatial dataset rather than the example project idea, your group will get **10 bonus marks for the group project. The bonus marks will be counted as 5 bonus marks for the Project Proposal and 5 bonus marks for the Group Presentation.** Please note that the bonus marks will only be awarded when your team finished all three parts of the Group Project.

Please find following some potential spatial data sources that may be helpful for your group to find geospatial data and develop your own real-world GIS problem:

Toronto Open Data: https://www.toronto.ca/city-government/data-research-maps/open-data/
Chicago Open Data: https://data.cityofchicago.org/
New York City Open Data: https://opendata.cityofnewyork.us/
U.S. Census Bureau: https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml
Esri Open Data: https://hub.arcgis.com/search
Natural Earth Data: http://www.naturalearthdata.com/downloads/
USGS Earth Explorer: https://earthexplorer.usgs.gov/
NASA's Socioeconomic Data and Applications Center (SEDAC): https://sedac.ciesin.columbia.edu/data/sets/browse
Open Topography: https://opentopography.org/

Project Requirements

1. The tool should be able to solve a reasonable real-world problem.
2. The tool should be developed by Python code with ArcPy.
3. The tool should use at least 5 different ArcPy spatial data processing functions.

Deliverables

Part 1: Project Proposal and Self Reflection Report (30 Marks [5%]; Due Nov 8 at 5:00 PM)

The project proposal is a 1-2 pages outline of your project title, objectives, available data and data sources, methodology (how would you achieve your objectives? what spatial analysis tools you will use?), and a detailed time schedule.

Each team should also finish and submit a self-reflection report to descript team members' current contributions to the group as well as their expected future contribution to finish the project together. The self-reflection form will be released on Quercus soon.

Part 2: Group Presentation (70 Marks [10%]; Dec 4 In-Class)

Your team will create a slideshow and give a presentation summarizing your project and your code. The presentation should be about 5 minutes following with a 2-minute Q&A. All group members need to participate in the presentation in order to count towards their grade. The slide show should consist of the following sections:

- Identify the problem you wish to solve and the scope of your project
- Background of the problem
- Description of how your group solved the problem with GIS programming
- A flowchart illustrating your data processing and programming
- Analysis of your work and results
- Description of each team member's contribution

Part 3: Presentation Slides, ArcMap Tool with Python Code, and Data (Due Dec 4 In-Class)

You have to submit your presentation slides (in the format of PowerPoint), ArcMap tool with Python code, and the data to Quercus before the in-class presentation in order to get your marks for the group project.

Only one submission is required per group, so please be sure to indicate your group number and who is in your group on the first page of your presentation slides.

Please zip your code and any data you used in a file called Code&Data.zip with a technical (ReadMe.txt file) description of all the files included.

Appendix: Example Project Idea

Problem statement

You are a director in the Vermont Department of Natural Resources and you need to conserve wildlife populations that are being threatened by habitat fragmentation. New roads, housing developments, and timber harvesting have broken large tracts of the contiguous forest into isolated patches that are too small for many forest-dwelling animals. To slow the rate of fragmentation, the department of natural resources needs to prioritize which lands to protect.

Since you cannot individually consider each wildlife species, you opt to design the conservation plan around an umbrella species. An umbrella species is a species generally high on the food chain which requires large areas of intact habitat. In this particular area, bobcat (Lynx rufus) will be your umbrella species.

By focusing your conservation efforts on protecting an umbrella species, you will indirectly protect other species with similar habitat needs. As the name implies, the bobcat acts as an umbrella for protecting other species with similar requirements.

Data

Steams – This layer is a feature dataset representing streams as line segments. Suitable habitat can be found in the dense riparian zones of streams.

Elevation – Elevation is continuous raster data that indicates the vertical height above sea level at each location.

LandUse – Land use is categorical raster data that indicates the type of land cover present at each location.

Goals

1. Create a suitability modeling tool by Python programming with ArcPy to identify the best locations or regions for conserving bobcat.
2. In your bobcat suitability model, you need to consider three different factors:
    - ***Habitat*** - Identifies the most preferred habitat for the bobcat to live within considering:

      Shelter (with forestland being the most preferred), access to water, and the terrain features (with steeper slopes being preferred).
    - ***Food*** - Identifies the most likely areas bobcat may find suitable food considering:

Access to the maximum amount of food (with forestland and grassland being preferred as well as access to prey)

- ***Security*** - Since the bobcat is an interior species and generally avoids human activity considering:

  Distance from houses, roads, and human development.

3. With your suitability model, you will need to identify several suitable regions for bobcat conservation. Each suitable region must be at least 10 contiguous square kilometers.
4. Analyze your results and justify your suitability model.