SGO1910 – Introduction to Geographical Information Systems (GIS) Exam

Suggested marking criteria in red (its not exhaustive, also if they go far beyond expectation for a particular marking 'point' feel free to award an extra mark)

The exam consists of three parts:

- Part 1 involves five questions (30 % of grade)
- Part 2 involves two questions (35 % of grade)
- Part 3 involves answering one out of two questions (35 % of grade)

Part 1 (30 % of the grade)

Give a short answer to *all* five questions. You are welcome to use examples.

Q1. Describe the modifiable area unit problem (MAUP) (max 150 words) (upto 4 marks)

Appropriately describing (1 mark each):

- Aggregation/scale
- Arbitrary boundaries
- Rezoning/shape/modifiable
- An example, e.g. gerrymandering
- Statistical bias

Q2. Explain vector and raster data, give an example of each, and compare the two (max 150 words) (upto 4 marks)

- Appropriate definition of each (1 mark each)
- Appropriate example of each (1 mark each)
- An appropriate difference (1 mark each upto 2 marks)

Q3. Describe the four types of distortion that can occur in different map projections (max 150 words) (upto 4 marks)

Appropriately describing (1 mark each):

- Shape
- Area
- Distance
- Direction
- Why distortions occur
- Compromise projection

Q4. Describe Tobler's first law of geography (max 150 words) (upto 4 marks)

- Getting the quote almost correct (2 mark) or correct in meaning only (1 mark)
- Explaining spatial dependence (upto 2 marks)
- Giving an appropriate example (1 mark)

Q5. Describe three different types of research designs used in spatial analysis (max 150 words) (upto 4 marks)

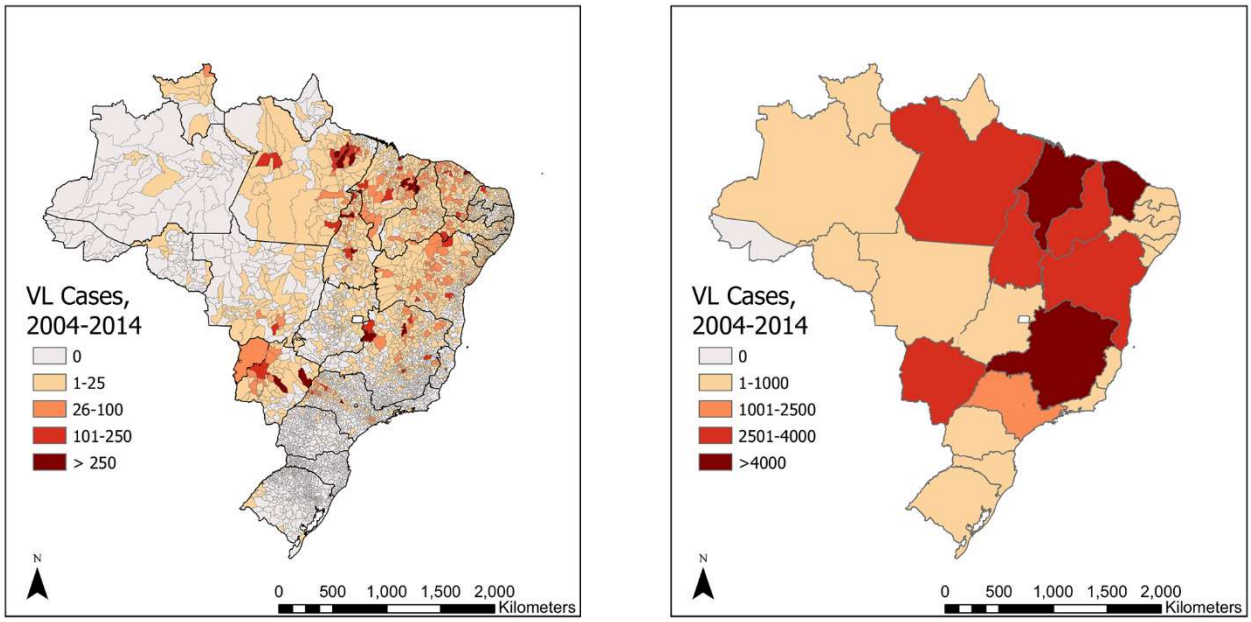
Appropriately describing (1 mark each):

- Inductive/exploratory
- Deductive/confirmatory
- Normative
- Longitudinal
- Mentioning not completely distinct

Part 2 (35% of the grade)

Answer *both* questions.

The following maps are both of 'Visceral Leishmaniasis' (VL) cases (a disease caused by parasites) in Brazil between 2004 and 2014.



(a) (b)

Source: Servadio et al. 2020. Information differences across spatial resolutions and scales for disease surveillance and analysis: The case of Visceral Leishmaniasis in Brazil. PLOS ONE.

Q1. Describe the maps and interpret the main pattern of results (max 200 words) (upto 5 marks)

- Appropriately describing type of maps (quantitative choropleth map, count of cases,) (upto 2 marks)
- Appropriately describing the main patterns (locations) in each map (1 mark per map)
- Appropriately describing clustering/spatial autocorrelation (1 mark) or aggregation (1 mark)
- Appropriately comparing the results across the two maps (upto 2 marks)

Q2. Explain why the two maps look different and how can these differences be problematic (max 300 words) (upto 8 marks)

- Appropriately describing aggregation (upto 2 marks)

- Appropriately describing aggregation effect in general (upto 2 marks)
- Giving examples across the two maps (upto 3 marks)
- Appropriately mentioning the differences in classification, counts/scale used, … (upto 2 marks)

Part 3 (35% of grade)

Write an essay answering *one* of the questions.

Q1. What is a network and how can they be important and used in spatial analyses? (max 500 words) (upto 13marks)

Appropriately describing (1 mark each unless specified):

- Network is a graph (or mentioning graph theory)
- Containing edges/links and vertices/nodes (lines and points not allowed)
- Describing connectivity
- Giving an example of a network
- Directed vs undirected
- Error and uncertainty (missing links, inaccurate data, upto 2 marks)
- Euclidean vs network distance
- Example where Euclidean is different and can be important (upto 3 marks)
- Describing path/route optimization, service area, accessibility… (upto 2 marks each)
- Giving examples of the above analyses (upto 3 marks)

Q2. What is spatial autocorrelation and what are the differences and meanings of analyses of *global* and *local* spatial autocorrelation (max 500 words) (upto 13marks)

Appropriately describing (1 mark each unless specified):

- Appropriate definition of spatial autocorrelation in general (upto 2 marks)
- Description of negative, no and positive autocorrelation (upto 2 marks)
- Example of each of the above (1 mark each)
- Appropriate definitions of local and global (1 mark each with extra for naming global and local moran's and mentioning z-score/p-value)
- Description how they can give different results/interpretations (upto 2 marks)
- Discussion of 'near' (1 mark), naming and explaining different types (upto 2 marks)
- Explaining MAUP or ecological fallacy (upto 2 marks jointly)