Geography 377 Study Questions For Lectures 15-27

By A-Xing Zhu

Lecture 15:

1. When do we use Affine Transformation and when do we use Rubber Sheeting to perform coordinate transformation?

2. How to choose initial control points and how to refine control points in Rubber Sheeting transformation?

3. Compare and contrast file access approach and DBMS approach to manage conventional databases.

4. What are the unique aspects of spatial database and what are the common types of DBMS used in GIS?

Lecture 16:

1. Why do we need metadata? What are the basic aspects that metadata must cover? Who should create and maintain metadata?

2. Describe the procedures involved in creating a raster database from various sources? How is that different from the construction of a vector database?

3. Who is FGDC? What is its main task?

4. Why do we need data standards?

Lecture 17:

1. What kind of questions can GIS answer?

2. What is a spatial query? Why is GIS particularly suited to address spatial queries?

3. What are the different types of spatial queries? Give an example for each of them.

Lecture 18:

1. How to determine the size of a particular patch under the raster data model? (the size of one patch)

2. Buffering under raster is not accurate. Why do people say that? What is a commission error and an omission error
under the context of a raster buffer?

3. What is 4-connected and what is 8 connected?

4. How would one determine if a point is in a particular polygon or not? Why do people say that point-in-polygon is the fundamental operation for spatial search?

**Lecture 19:**

1. Why do we need spatial interpolation? What is the basis for us to estimate the attribute value of an un-visited site using attributes collected at nearby locations?

2. What is the basic equation for spatial interpolation? What are the main issues in using this equation?

3. What is the basic idea of nearest neighbor approach? How is it implemented and what are the issues associated with it?

4. What is the basic idea of inverse distance method? What is $r$? What happens to the interpolated value when $r$ increases?

5. What is a validation data set? Is it the same as the sample set used in spatial interpolation? How would one evaluate the success of an interpolated coverage?

**Lecture 20:**

1. What are ways for capturing digital elevation data?

2. What are the ways for representing digital elevation data?

3. The raster representation is quite easy for computing terrain attributes. Explain why so.

4. What are slope gradient and slope aspect? What are the basic formula to define them, respectively?

5. How the rate of elevation change in x-direction and in y-direction is defined, respectively, under the 2nd order finite difference method? How is this definition different from that under the 3rd order finite difference method? Which one is more accurate? Why?

**Lecture 21:**

1. What are the steps in computing statistics using GIS?

2. How would one compute the average tree height for the largest forest patch under the raster data model with only the tree height data layer (no zonal layer provided)?
3. What is a signature and what is a texture?

4. Describe the steps used in image classification.

5. How is image classification different from image segmentation?

**Lecture 22:**

1. What is a spatial overlay? What are the typical steps involved in spatial overlay?

2. How is spatial overlay operation done under the raster representation? Why do we call overlay operation under raster “map algebra”?

3. How is spatial overlay operation done under the vector representation? Why is spatial overlay under vector more complicated than that under raster?

4. What is a sliver polygon? Are all sliver polygon erroneous? How would one determine which sliver polygon is erroneous or not? How would one remove an erroneous polygon?

5. Why are all attributes carried over into the output data layer under polygon overlay?

**Lecture 24:**

1. What is the difference between error and uncertainty?

2. What are the sources of errors in GIS data?

3. What are the four assumptions about data in GIS and how are they violated and what are the possible solutions?

4. What are the differences between geographic presentation and geographic representation?

5. Is a map representation or presentation? Are all GIS data layers of geographic representation? Why?

6. What is the danger in treating a geographic presentation as geographic representation?

**Lectures 25-26:**

1. What is Spatial Modeling? What is GIS-based Spatial Modeling?

2. What are the steps in spatial modeling using GIS?

3. What is conceptualization and what is implementation?
4. Why do people say that domain knowledge is extremely important in GIS-based spatial modeling? Give an example.

**Lecture 27:**

1. What are the essential aspects one must consider in developing a sustainable GIS operation?

2. What are the general steps in setting up such a GIS operation?

3. In your mind, what is the most important thing (besides money) that will make a GIS operation sustainable? Why?