CS 980EQ: Topics in GIS & Geoprocessing (Summer 2018) Assignment 3

Due Date and Time: Saturday, July 7, 2018 at 11:55 PM.

Important Notes:

- Submit your assignment through URCourses
- Include a cover page with your assignment, including your first and last name, student ID, and assignment#
- If you are submitting more than one file, include all the files in one zip file

Total Mark: 50 + 50 = 100

Raster Analysis

Readings: Lecture Notes, Chapter 10

Answer the following questions using your own words. 5 marks for each question:

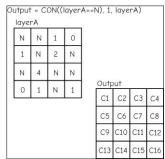
- 1. What is map algebra?
- 2. Why must raster layers have compatible cell sizes and orientations for most raster combination operations?
- 3. What is a null value in a raster data set? How is this null value typically treated in a raster operation?
- 4. What is the scope of a raster operation?
- 5. Perform the listed raster operations

3	2	4	11	9	1	3	Perform the following operations with a 3x3 window, centered on the noted cells
1	6	5	20	14	8	7	-average, on the circle,
7	13)	2	1	4	9	11	-standard deviation, on the circle -maximum, on the triangle,
12	11	10	8	5	6	10	-value range, on the square, -average, on the ellipse,
3	2	1	17	1	11	9	-median, on the star
8	5	6	8	3	13	16	
19	17	9	11	(12)	7	15	

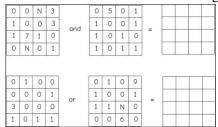
6. What are the values in cells C5, C7, C10, and C13 in the output layer?

		Inp	ut			Output									
a)	1	3	1	1	Reclass by table	in O	out			×	f	×	,		
	0	N	2	-1		1 2	x b		а	N	Ь	1	1		
	1	2	5	0		3	f	=	×	Ь	s	a			
	0	1	N	N		5	c			а	×	N	N	1	
				_										_	
b)	1	3	1	1		in	range	out]		а	b	а	а	
	0	N	2	-1	Reclass by ranges	0	to 1.5	а			а	d	Ь	N	
	1	2	5	0			to 3.5	Ь	=	T	а	ь	С	a	
	0	1	N	N		3.	5 to 10	С		ŀ	а	Ь	d	d	
		1	14	14			N	d		L	u	U	u	u	

7. What are the cell values for cells C2, C5, C7, and C11 in the output layer, below?



- 8. Does a NOT operation applied to a raster cell value containing a NULL value return a NULL value, a zero value, a 1, or some other nonnull value?
- 9. Provide the answer for the following logical operations:



10. What is a kernel in a moving window operation? Does the kernel size or shape change for different portions of the raster data set? Why or why not?

Remote Sensing

Readings: Lecture Notes, Textbook: chapter 6, Remote Sensing Tutorial

Answer the following questions using your own words. 5 marks for each question:

- 1. Describe several positive attributes of images as data sources?
- 2. What is the electromagnetic spectrum, and what are the principle wavelength regions?
- 3. Define a spectral reflectance curve. Draw typical curves for vegetation and soil through the visible and infrared portions of the spectrum.
- 4. How are images from satellite scanners different from photographs? How are they similar?
- 5. What is a LiDAR? What type of information can LiDAR produce?
- 6. Describe the different types of image resolution: spatial, spectral, temporal, radiometric
- 7. What are the major sources of geometric distortion in aerial images, and why? What are other, usually minor, sources of geometric distortion in aerial images?
- 8. What is photo-interpretation, and what are the main photographic characteristics used during interpretation?
- 9. What is image classification? Describe the two methods used in image classification.
- 10. What are three criteria used in selecting the type of images for spatial data development?

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