M.Sc. Remote Sensing and GIS

RT-202

Geographic Information System

Unit-III

3.3 Raster Based Spatial Data Analysis – Part-I

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Introduction

- Raster data are particularly suited to certain types of analyses, such as basic geoprocessing, surface analysis, and terrain mapping.
- Like the geoprocessing tools available for use on vector datasets, raster data can undergo similar spatial operations. Although the actual computation of these operations is significantly different from their vector counterparts, their conceptual underpinning is similar. The geoprocessing techniques covered here include both single layer and multiple layer operations.

Single Layer Analysis

- Reclassifying, or recoding, a dataset is commonly one of the first steps undertaken during raster analysis.
- Reclassification is basically the single layer process of assigning a new class or range value to all pixels in the dataset based on their original values.
- For example, an elevation grid commonly contains a different value for nearly every cell within its extent. These values could be simplified by aggregating each pixel value in a few discrete classes (i.e., 0–100 = “1,” 101–200 = “2,” 201–300 = “3,” etc.). This simplification allows for fewer unique values and least storage requirements.

Reclassifying, or recoding

Input Raster

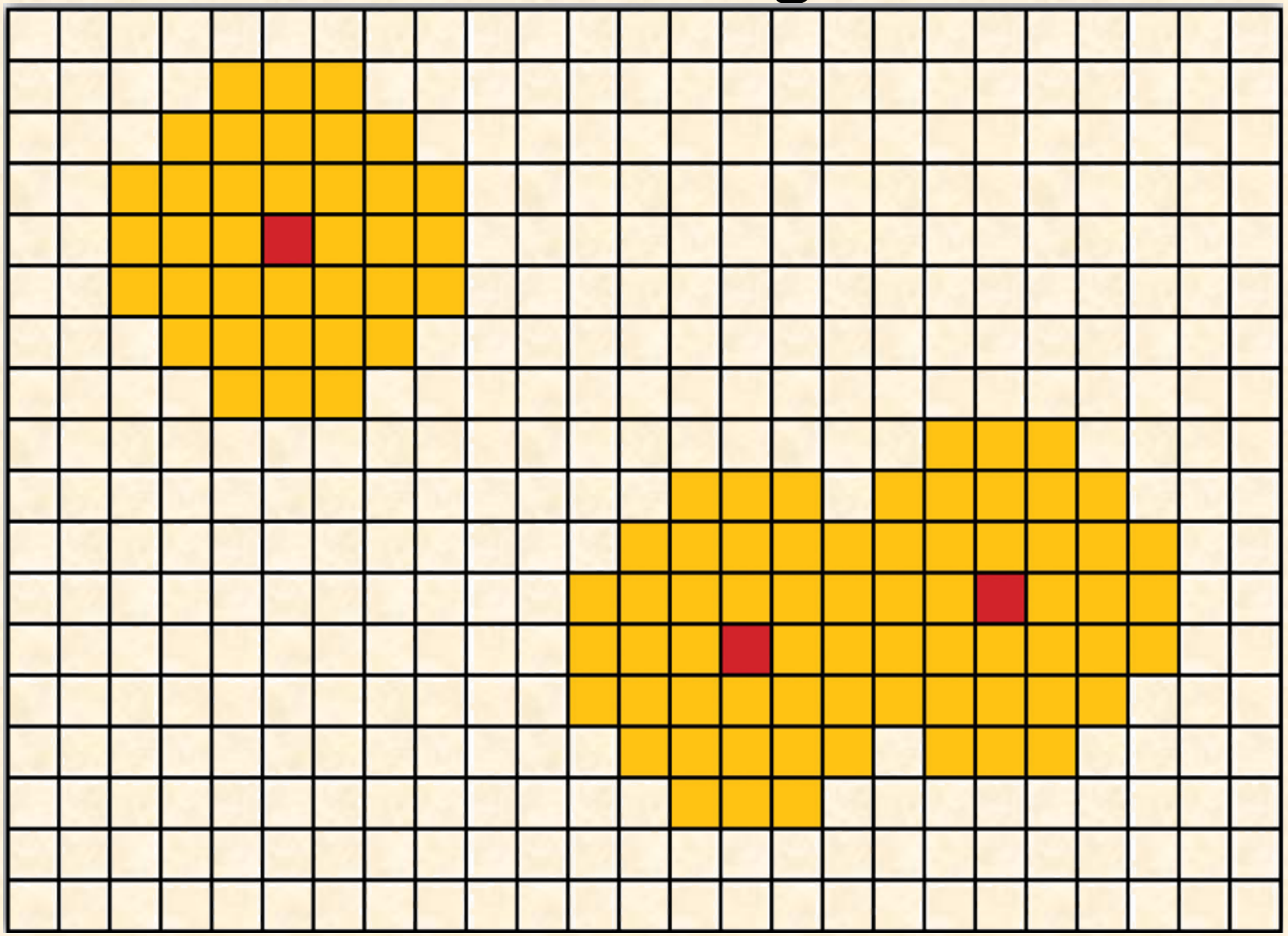
456	416	364	326	243
448	364	315	276	218
359	325	268	234	164
306	296	201	133	44
274	231	184	65	5

Reclassified Raster

5	5	4	4	3
5	4	4	3	3
4	4	3	3	2
4	3	3	2	1
3	3	2	1	1

- Buffering is the process of creating an output dataset that contains a zone (or zones) of a specified width around an input feature.
- In the case of raster datasets, these input features are given as a grid cell or a group of grid cells containing a uniform value (e.g., buffer all cells whose value = 1).
- Buffers are particularly suited for determining the area of influence around features of interest. Whereas buffering vector data results in a precise area of influence at a specified distance from the target feature, raster buffers tend to be approximations representing those cells that are within the specified distance range of the target.

Buffering



- Most geographic information system (GIS) programs calculate raster buffers by creating a grid of distance values from the center of the target cell(s) to the center of the neighboring cells and then reclassifying those distances such that a “1” represents those cells composing the original target, a “2” represents those cells within the user-defined buffer area, and a “0” represents those cells outside of the target and buffer areas. These cells could also be further classified to represent multiple ring buffers by including values of “3,” “4,” “5,” and so forth, to represent concentric distances around the target cell(s).

- In addition, these reclassified layers are often used as inputs in secondary analyses, such as those discussed later in this section.

Multiple Layer Analysis

- **Clipping**
  - A raster dataset can also be clipped similar to a vector dataset Here, the input raster is overlain by a vector polygon clip layer. The raster clip process results in a single raster that is identical to the input raster but shares the extent of the polygon clip layer.

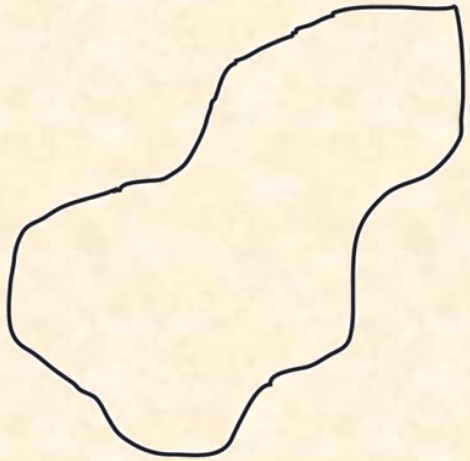
Clipping a Raster to a Vector Polygon Layer

Input Raster

5	3	4	4	4
2	1	4	2	6
8	4	3	5	3
4	2	4	3	2
6	3	3	7	4

+

Clip Vector



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Output Raster

-	-	-	4	4
-	-	4	2	6
8	4	3	5	-
4	2	4	3	-
-	3	3	-	-

Cont…