Lab #6

Hayden Atchley

7 October 2022

CE 414

The aim of this lab is to delineate streams and watersheds in Rock Canyon, Utah. An input DEM raster was obtained from LearningSuite as part of this lab, and a polyline shapefile of streams in Utah was obtained from <https://gis.utah.gov>. The rivers and watersheds were delineated based on flow direction and accumulation.

# The Model

A screenshot of the model in the geoprocessing interface can be seen in Figure 1, and a diagram of the model in Figure 2. The first step was to combine the 4 DEM rasters given into a single one using the Mosaic to Raster tool. I then used the Fill, Flow Direction, and Flow Accumulation tools in sequence, which produced a “filled” DEM, a flow direction raster, and a flow accumulation raster, respectively. I used the default D8 direction and no weights.

With the flow accumulation raster, I was able to delineate streams. I used the Greater Than tool to select cells with a flow accumulation of 30,000 or more. I chose this value as the final map delineated streams and watersheds on about the scale I wanted. These selected cells became a new raster, and that raster was converted to a polyline using the Raster to Polyline tool. I then created a point shapefile of this polyline’s vertices.

I used the output flow direction raster and the stream vertices point file as inputs to the Watershed tool. This created a raster indicating the delineated watersheds, and I converted that raster to a polygon shapefile using the Raster to Polygon tool. This resulted in a polygon shapefile of the delineated watersheds.

As a final step, I clipped both the streams and watersheds to the boundaries of Rock Canyon, as the input data covered much more area than that. I used the watershed boundaries themselves to delineate Rock Canyon.

# Results

The map I produced is given in Figure 3. This shows around 7 or 8 watersheds within Rock Canyon, whose borders follow along ridges or perpendicularly down a slope. This is essentially what I expected, as it matches up perfectly with the underlying basemap’s features. The streams did not match up so well with the actual stream data though. Where I *did* calculate streams, they were exactly in line with the actual streams, but there are many more streams than I calculated. This is likely due to the exact threshold value I chose (30,000): a lower value would identify more streams, but would also identify more watersheds. As such, I considered this value a good compromise.

Graphical user interface, application

Description automatically generated with medium confidence

Figure : The model in the geoprocessing interface.

# 

Figure 2: Diagram of model used in this lab.

Map

Description automatically generated

Figure 3: Output map showing Rock Canyon watersheds.

|  |  |
| --- | --- |
| **Item** | **Points** |
| Assignment Title, Name, Date, Course | 2/2 |
| Brief summary of the requirements of the project in your words | 3/3 |
| Describe your model   * List each of the tools used: (1 pts.) * List tool settings applied for the analysis (1 pts.) * List all input, intermediate, and output datasets: (1 pts.) * Describe each input dataset including type (point, line, polygon, raster) and the source of the data: (1 pts.) * Describe each output dataset (point, line, polygon, raster): (1 pts.) | 5/5 |
| Show your model   * One or more full pages (8.5 x 11) showing your model (5 pts.) * All text is readable (10pt. font minimum) (3 pts.) * All tools and data sets are shown (2 pts.) | 10/10 |
| Show a ModelBuilder Tool interface   * Include user interface for setting the input data (3 pts.) * Include user interface for setting the output data (3 pts.) * Include user interface for adjusting the SQL statement that specifies the threshold value (3 pts) * Customize the title and other labels (1 pt.) | 10/10 |
| **Map your results.** Make a full-page map showing the results of your watershed analysis for the provided Rock Canyon data.   * Map Title: (1 pt.) * Neat Line: (1 pt.) * North Arrow: (1 pt.) * Scale Bar: (1 pt.) * Text box with author name, date, map projection: (1 pt.) * Delineated watershed boundaries, stream network, and given stream network shown: (5 pts.) * Each data set clearly symbolized: (1 pt.) * Visible basemap showing underlying terrain data: (1 pt.) * Labels indicating NHD versus delineated stream network: (1 pt.) * Zoomed to an appropriate scale for viewing analysis results: (1 pt.) * All text is legible on printed map: (1 pt.) | 15/15 |
| Discuss your results   * How does your delineated stream compare to the NHD data? How does the watershed boundary compare to the terrain visible in a basemap? (3 pts.)   Are your results as expected or did you find anything interesting or different than expected? (2 pts.) | 5/5 |
| Bonus: Rerun the analysis on another data set | Grader Discretion |
| **Total points possible:** | 50/50 |