

## GEOG3130 Advanced GIS

### Assignment 7 Vector Data Manipulation and Geometry

Total points: 20 points

Trajectory analysis. You are expected to analyze the trajectories of different hurricanes. Every group is expected to produce a line layer based on the trajectory information of **5** hurricanes. The track data is available at: <http://www.nhc.noaa.gov/data/#hurdat> (downloadable link: <http://www.nhc.noaa.gov/data/hurdat/hurdat2-1851-2015-070616.txt>). There are two types of lines of data in the new format: the header line and the data lines. The format is comma delimited to maximize its ease in use. More information of the file can be found at: <http://www.nhc.noaa.gov/data/hurdat/hurdat2-format-atlantic.pdf>

**Note: A summary of errors (no more than five) when you develop the script (Step 3 only) and the solutions to errors should be provided.**

1. Data preprocessing. Download the file. View the content of the file and identify the hurricanes you want to track. “NONAME” hurricanes are not included. You should save a copy of the track file which only includes the hurricane tracks you are interested. Save the processed file as a new text file. **What are the hurricanes? What are the attributes of hurricanes stored in the file (e.g., NAME, SPEED)? (2 points).**
2. From the file in Step 1, remove the header lines and save it as a new file. Create a point shapefile layer to show the tracks of hurricanes. View the locations in ArcMap as a point layer using *Display XY locations* function. Provide a screenshot of the point layer. **(2 points)**
3. Use Arcpy to create a line layer based on the information of the text file from Step 1.
  - a. Explain the way of identifying trajectories: **what are points that should be connected to form a line to represent a trajectory? (2 points)**
  - b. Create a new line feature layer. **Two additional attributes should be included: the name of the hurricane and the number of tracks.** Note the name field is a text field. You should specify the length of the field correctly. **(4 points)**
  - c. Read information from the file to create hurricane paths. **(6 points)**
    - i. When the line starting with “AL” is detected, indicating the information of a new hurricane is added, a new empty array should be created to store all tracks of the hurricane. The name of the hurricane and the number of tracks should be stored and inserted into the attribute table later.
    - ii. When a data line is detected, a point should be created and stored into the array.
    - iii. When the number of points of the array is equal to the number of track entries stored in the header line, a line completes. You may use the

attribute property *count* of the Array class to identify the number of points in an array.

- iv. When a polyline is completed, insert the polyline into the table along with two other attribute values of the hurricane.
- d. The coordinate values should be correctly stored. Pay attention to the sign of coordinate values (e.g., N, W, S, E). **(2 points)**
4. View the point and the line layers in ArcMap. You should use a geographic coordinate system as the coordinate system of the data frame. Produce a final map based on the information. Describe the distributions of the hurricanes in the map. **(2 points)**

Deliverable:

1. A python script from Step 3.
2. A written document including all answers to questions. A summary of errors (no more than five) and the solutions to errors should be provided.
3. A map from Step 4.