Christopher Chen

11/28/18

GIS 224-50

Prof. Sean McHugh

*Should a basic understanding of Computer Science and complex algorithms be taught along GIS to fully grasp all content of the program?*

ArcGIS has been an application for working with maps and geographic information for nearly 18 years, and since its initial release. GIS uses large databases and complex algorithms that creates a visual representation of whatever information presented to it. Behind all these algorithms is code that allows these processes to work. There has been multiple arguments stating GIS as either a tool or a science, if a science, it should correlate with most Computer Science courses since all geoprocesses are based in programming languages. If so, I believe a basic understanding of Computer Science and complex algorithms be taught along GIS in order to grasp all content of the program.

GIS uses the programming language Python since version 9.0. Python itself is a free, cross platform, open-source programming language that is very flexible when it comes to learning, it is very quick to learn the basics, and visually simplistic. It is widely supported like the other programming language Java, but more beginner friendly. Python is known for its automation and data analysis capabilities. Python comes with many advantages compared to other programming languages such as, scripting is highly scalable to best fit each project, it has cross-platform capabilities, and it is embeddable, stable, and largely accepted by most users. Since the establishment of Python within GIS, users has created custom geoproccesses providing more capabilities within the programming, allowing users to use ArcGIS to its fullest extent. Python has allowed users access to building tools to build their own tools to work with what data that may be presented in front of them.

Certain aspects of Computer Science should be taught along GIS for users to full grasp the processes that are used with in the programming. GIS is the application of Compute Science theories on geographic information. All geoprocesses and tools within GIS can be integrated within Python allowing creation of custom programs and geoprocesses to best fit certain projects. Python multiple custom classes to allow access to a multitude of methods extending the ways information and code would be utilized.

To show the capabilities of applying Computer Science theories within GIS, I created a custom program in order to manage certain data. I utilized the New Jersey County shape file for each to create a code, taking the data from the shape file and create separate table within a geodatabase to show the results. In order to use the methods within Python the code had to import two different classes, “arcpy” which gives access to most methods to perform geographic data analysis, data conversion, data management, and map automation, and “numpy” which gives access to certain methods concern sets of numeric datatypes and used when creating arrays. Next, I created a workspace in which all the data would be saved within called “FinalGeodatabase.gdb”, a geodatabase. I saved the workspace address as a variable “outpath” to allow ease of access when calling the workspace. I then saved the variable called “input” which was the address of the shape file that I would be taking the information used within the code. Using the method “CreateTable\_management()” I created a table called “POP2010\_DIFF” at the address “outpath”. After, I created four separate columns using the “AddField\_management()” method, for “COUNTY”, “POP2010”, “POP2000”, and “POP\_DIFF”. I then created an object array called “countyInfo” using the method “TableToNumPyArray” taking the data from the shape file, from the fields “COUNTY”, “POP2010”, and “POP2000”. A variable “editrows” was then created to allow the table “POP2010\_DIFF” to be edited. The two methods of “fields” and “insert” allowed the fields to be edited and data to be inputted within the table. A for-loop was created to loop through the array “countyInfo” to input the data into the new table. The temporary variable “n” was created to store the variable of the array “COUNTY”, the variable “diff” was created to store the difference between the population in 2010 and 2000. Then the variable “rows” is a two dimensional array to store both the variables “n” and “diff”. Then “row” was inputted into the “editrows.insertRow()” method. Once the loop was finished running through all the indexes of the “countyInfo” array, the “del editrows” command will stop editing the table and close it.

Computer Science allows users to have a greater utilization of the program. Even with little experience with python, I was able to create a program in which I was able to store and analyze data, and create a separate table to store it separately from the shape file. If users had a better understand of coding and other complex algorithms and theorems, it would allows others to fully grasp all of the content within GIS.