Summary: From GPS and Google Earth to Spatial Computing

This class teaches the principle of GIS and spatial computing from the computer science’s perspective. It includes a variety of interesting topics for lectures and some useful and inspiring lab/web works. The lectures include spatial and temporal concept, which is very helpful for students majoring in Computer Science, but more importantly emphasize in spatial (and temporal) data models, data structure and access, spatial architecture and infrastructure, and interfaces of spatial computing applications. As both of our team members are from Department of Geography, this class helped us experience a multiple of things we seldom do in our regular academic activities.

First and foremost, we had a chance to work with University’s Office of Classroom Management that we explored several possibilities to infuse GIS in their online scheduling system. This class not only gave us insights on system and interface design but also pointed out a way for us to think about what modifications we could apply on their current and future setup to achieve such a goal. What’s more exciting is we shared our project just like everyone else did, and by doing so we envisioned a promising prospect as computer scientists and geographers corporate to facilitate our life. We learned about a number of algorithms and thought about their real world meanings. For instance the Delaunay Triangulation and Voronoi Diagram have real world strategic meanings to distance and distribution related activities. But when it comes to time-first responses, there are other algorithms to find out the best path/route based on a variety of situations. We also realized how to use abstraction to simplify and construct models for real world activities so that we can use facilities to take computational tasks. During this semester, we really think students from different academic background connected with each other, just like GIScience is an organic integration between traditional Geography and Computer Science.

We also had a chance to do some research in the GIS Encyclopedia. Despite the related chapter: the Introduction, we broadened our perspectives on GIScience as a whole, especially on Location Based Service. We showed a table categorizing various aspects it involves and made assumptions about what functionalities a “smart car” should have and how it can surpass the combination of a car and a smartphone. We even found out that Google has already done some implementation about auto-driving cars for blind people. Thus we think the Trend part in this class is really informative and excellent for sharing what we have learnt.

The Web assignment part was fun. It was the first time for us to use Mapping API to make some web applications. It is very inspirational to us because the technique is very easy transferrable. And we can catch up with other types of APIs very quick by reading their reference pages. We highly recognize its importance as sooner or later, web maps will start to add more geo-processing functionalities, and we can use their APIs to customize our own applications, which could eventually become really powerful. We also think Google is ahead of this game for their support of Google Map, Google Earth, Google Calendar and Google Fusion Table. The potential of their integration can be endless, and the best part is since they are all under Google Company, there will be no issue about the compatibility. And it’s all about our imagination and creativities to take advantage and control of such technology.
Some lectures from this class gave us some new areas to think about or work on. For example in Chapter 6, the lecture talked about some popular data structures for raster and vector data. But how about for 3D GIS in the future? Can those data structures be easily transferrable? It looks like we can do Octotree for 3D GIS, and I’m sure the R-tree family will have their 3D version as well, but can they have the same efficiency/complexity? Things will change when we add one more dimension. Especially in 3D GIS, there will be redefinition of data compression, which will play a very vital part because the data size will go beyond the chart. Besides, what’s the role of raster data in 3D GIS? We are curious to know what voxels will bring to this game can how we can manage and manipulate it. Another example is about time GIS. As our project has involved in managing temporal data and we recorded a flash file to express it in animation, we start to think possibilities to visualize time related data in a way similar to viewing flashes. It will be fantastic for visualizing trajectories as we could visualize not only the route but also the speed of an object. And if it’s a vehicle, we can even use the “key frame” concept to let the system interpolate, due to common sense that cars will be running on the road in majority of the cases.

Finally about the improvement, we think the amount of homework is significantly above the average, even it’s for a 2 person group. We would like to see more stuff in the Web part, and we think it can be better planned. For example, it can be designed in a more sequential fashion so that student can build up an application at the end of the semester. We can start from creating a data gathering application in W1, data gathering and importing in W2, building web maps and apps in W3 and W4. We think it will be more enjoyable if the assignment is built upon previous works. Or perhaps it can be designed in another way to cooperate with the Lab work. Doing some data gathering in Web assignment and input them into database, then in the next Lab work, try to do some query or other operations. In general, we think the lectures are very good, and the amount of assignment should be extenuated (or by increasing the number of members in a group).