University of San Francisco Geospatial Analysis Lab

This summer I worked as an intern for the University of San Francisco’s Geospatial Analysis Lab. The Geospatial Analysis Lab, or GsAL, serves as the core facility and department providing education and support for all geographic information science (GIS)-based learning at the University of San Francisco. Over the last five years, the GsAL faculty and staff have been developing a curricular certificate for undergraduate and graduate students interested in studying GIS technologies. The formation of this program has created a well-informed and incredibly helpful group of students and teachers who share a passion for geospatial analysis.

The majority of my work this summer was under the management of Dr. David Saah. Dr. Saah is a leader in the field of geospatial research, with expertise in a number of areas including landscape and ecosystem ecology, hydrology, geomorphology, GIS, and remote sensing. Dr. Saah was also the major driving force behind the development of the University’s GIS certificate program and works for an environmental think-tank, the Spatial Informatics Group (SIG), which is one of the premier research groups specializing in the characterization and assessment of wildland and urban landscapes. Unfortunately, due to his high demand and extremely busy work schedule, he spent the majority of the summer traveling and teaching, only being present in the lab briefly over a couple of days during the time I was in San Francisco.

Over the course of the summer, Dr. Saah had two primary objectives for me. First, I was to work on a new research project alongside the Air Resources Board of California (ARB). My role in the project, with the assistance of GsAL coordinator Megan Danielson, was to use a new form of “remote sensing”, defined as the scanning of the earth by satellite or high-flying aircraft
in order to obtain information about it, to estimate forest metrics, such as aboveground live biomass, for a number of study sites in northern California. The form of remote sensing we were working with is known as LiDAR, or light detection and ranging. This data is collected by an aircraft with a laser system mounted on its base that measures, with extreme accuracy, the relative heights of features and their geographic location. This information can be manipulated to derive a number of calculations and, along with their geographic orientations, can be mapped to visualize the results of a study. However, the raw data that is delivered is very large and often unorganized, which required a couple of weeks of front end organization. Once the data had been collected from their respective governmental agencies and subsequently organized, I was charged with investigating and carrying out a study of open-source (free to the public) LiDAR analysis software. After finding a program that would suit our specific needs for the research project, I developed a detailed set of instructions so the study could be repeated in the future. Additionally, because we were unable to acquire all of the necessary datasets prior to my departure, the workflow will be utilized to complete the research project in the near future.

My second project for the summer consisted of developing an eight week graduate level introductory course on LiDAR. Because of its countless applications and rapid development, the use of LiDAR data in nearly all environmentally related fields of study has become commonplace both in academia and industry; therefore, the University of San Francisco believes that an introductory course is necessary for their GIS certificate program. In order to develop this course, the lab coordinator, a fellow intern, and I drafted a course syllabus and created a lecture including PowerPoint slides, lab exercises, and homework assignments for each day of the
eight-week course. This portion of my internship was very interesting as it gave me the opportunity to explore the many applications of LiDAR analysis including forestry, geology, engineering, and city planning. Additionally, we were able to utilize many different analysis programs and develop a working knowledge on the intricacies of computer science and coding. Because the course is to be taught on a subject my coworkers and I knew relatively nothing about prior to this summer, I had to conduct a large amount of literature review and teach myself most, if not everything, that I currently know about LiDAR. The development of this course is also beneficial to the University of the South, which has recently acquired a LiDAR dataset for the domain and seeks to promote its use among students and staff for environmental research; however, until now, there has been little in the way of resources for students, other than through independent research, to conduct analysis. It is my hope that this course and its exercises will provide interested students with a resource that will teach them the basics of LiDAR analysis and provide a number of uses which may be applied to studies of the domain.

This internship in one of the United States’ most incredible cities has taught me a great deal. I had initially arrived at the University of San Francisco with a research project centered on creating a set of hydrology specific maps for the University of the South, but this project was quickly derailed by Dr. Saah’s summer project interests and scope of work. Because of this, I was concerned that I would be coming back to Sewanee empty handed; however, my research advisor, Dr. Chris Van de Ven, encouraged me to follow the lead of Dr. Saah and focus on gaining a better knowledge and set of skills concerning the use of LiDAR data. With his support, I was able to expand my knowledge on the subject matter well beyond what I would have
obtained if I had worked solely on my initial narrowly-focused project. This experience taught me to be more flexible as my daily projects and work schedule were consistently changing. My previous work experiences have been sufficiently more structured, and while I was granted much more freedom with my manager traveling the majority of the summer, project deadlines and high expectations required me to push myself to become more productive and driven without direct oversight. Having the opportunity to work among a number of graduate students and to help put together a graduate level course helped to solidify my interest in pursuing a master’s degree following my graduation from The University of the South. Overall, my work at the University of San Francisco’s GsAL gave me a greater appreciation for environmental research and the countless possibilities modern advancements in technology offer.