Time & Location: April 8, 2015 at 9:30 AM in Engineering 2 324
Title: Development of an Automated Method for Identification of Wet and Dry Channel Segments Using LiDAR Data and Fuzzy Logic Cluster Analysis

Research into the use of LiDAR data for use in alternate methods, such as urban land cover classification and the identification of forest biomass has become prominent in recent years. In many cases, the alternative analysis methodologies conducted using airborne LiDAR data are possible because the raw data collected during a survey can include alternative information than the classically used elevation and coordinate points, the X, Y, and Z of the plane. In particular, intensity values for each point have been found to be a useful data set for wet and dry channel classification. LiDAR intensity return data is, in essence, a numeric representation of the characteristic light reflectivity of the object being scanned, the more reflective the object, the higher the intensity return will be. Intensity data points are collected over the course of the channel network and within the perceived banks of the channel. The variance in data from intensity returns lead to the use of fuzzy logic to identify the intensity cluster centers based on fuzzy memberships. Membership within a fuzzy data set is characterized as a gradient, with 0 representing non-membership and 1 representing full membership. The ultimate goal of this research is to design and develop an ArcGIS tool to identify wet and dry channel sections, given known channel network from topographic elevation, using a combination of intensity return values from LiDAR data and fuzzy logic clustering methods to produce reliable multi-class channel shape files in ArcGIS. The user will be able to input the maximum allowable bank slope, and a filtering percentage to more accurately accommodate the study area.

Alteration of the maximum allowable bank slope has been shown to effect the comparative quantity of high and low intensity centroids, but only in extreme bank slope conditions are the centroids changed enough to hamper results. However, interference from thick vegetation has been shown to lower intensity values in dry channel sections into the range of a wet channel. The addition of a filtering algorithm alleviates some of the interference, but not all. Overall results of the tool show an effective methodology where basic channel conditions are identified, but refinement of the tool could produce more accurate results.

Major: Civil Engineering

Educational Career:
Bachelor’s of Biology, BS, 2007, Florida State University
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Approved for distribution by Dingbao Wang, Committee Chair, on March 4, 2015.

The public is welcome to attend.