ABSTRACT(S) IN THIS SESSION

Technology and Geographic Literacy in K-12 Education
Dawson Belk, Undergraduate Research Assistant and Michael Crosby, PhD., Assistant Professor-GIS/Remote Sensing, Louisiana Tech University, Ruston, LA

ABSTRACT TEXT: In an increasingly closer global community, geographic literacy upon the general population is paramount. Geographic education should start early and be reinforced throughout the K-12 educational process. Freely available technology can be incorporated into existing curricula to allow students to actively participate in exploring the world around them and collecting their own data. This promotes a spatial awareness among students. This presentation will focus on the apps available and a general exercise that can be adapted for use along the spectrum of early-, middle-, and secondary education.

Mapper Rapper Presents Who Data?: The Beignet, Done That Tour
Alyssa Randall, GIS Analyst & Environmental Scientist, Planning Communities, LLC, Raleigh, NC

ABSTRACT TEXT: The mapper rapper is back to give you another hit! This year’s rap will address issues pertinent to Louisiana and the New Orleans area. Studies have shown that New Orleans may experience one of the highest levels of sea level rise in the world. Let’s talk about land subsistence, post-glacial rebound, and sediment load from the Mississippi River. How is climate change and increased greenhouse gas emissions playing a role in this rise? What types of mitigation can be done to ensure a more resilient community? Find out these answers and more, in a way that’s not a total bore.

Assessing Image Resolution Issues in Monitoring Streamside Management Zones
Conner Gay, Undergraduate Research Assistant and Michael Crosby, PhD., Assistant Professor/GIS and Remote Sensing, Louisiana Tech University, Ruston, LA

ABSTRACT TEXT: To monitor Best Management Practices (BMPs) for agriculture and forest operations, remotely-sensed data is often employed. For large-scale monitoring, this can include moderate resolution satellite data (e.g., Landsat) and image classification techniques to determine land cover types. However, if Streamside Management Zone (SMZ) encroachment occurs, it may go unrecognized without more extensive site visits or higher resolution data.

This presentation examines an area representative of a forest SMZ and encroachment by the introduction of row crops or timber harvest. Reflectance values were extracted to one-meter sub-pixels and perturbed using a value representative of short vegetation (pasture). Significant, greater than 40%, encroachment can occur into a 30-meter buffer before land use classification changes. The presentation will address economic impacts on a grower vs. the risk of detection.

When They Learn: Student Assessment of Parking Issues on Campus
Michael Crosby, PhD., Assistant Professor/GIS and Remote Sensing and Mason Richardson, Undergraduate Research Assistant, Louisiana Tech University, Ruston, LA

ABSTRACT TEXT: Undergraduate education in spatial technologies empowers students to assess issues on their respective campus. Students from a variety of majors – including natural resources, GIS, and engineering majors – developed a project using GIS software and applications to assess parking issues on campus. Students worked in groups to develop the type of data needed, the background data and information (geodatabase, etc.), collect the data, and analyze the results. They leveraged average student numbers that access parking lots against the number of available spaces to determine the average number of students at risk for parking violations on given days. Data was also collected on issues in various parking areas about visibility (paint/signage), damage areas (i.e., potholes), and potential solutions. This enables students to participate in issues that impact their experiences on campus and provides an avenue to communicate those issues to administrators.
A Fast Algorithm for Computing Approximate Distance in the Cartesian Plane
James Riechel, Claremont Graduate University (CGU), Claremont, CA

ABSTRACT TEXT: This article presents the theory behind what is possibly the fastest algorithm for computing approximate distances between two points in the Cartesian plane in two dimensions: the Manhattan distance. There is no faster metric that uses all available information. Three alternative metrics are rejected precisely because not all available information is used—even if they may be faster. Another, more accurate metric is considered and not completely rejected, but the Manhattan distance is chosen because it is faster. The theoretical performance of the exact or Euclidean distance and the Manhattan approximate distance are compared on an AMD Ryzen microprocessor by counting the latency of floating-point operations. The computation of the exact or Euclidean distance requires the computation of a square root. The AMD Ryzen microprocessor offers hardware support to compute a floating-point square root. The best case, worst case, and average case performance of the Manhattan distance’s accuracy are considered. The Manhattan approximate distance metric overestimates distance by between 100% and 141.42% of the exact or Euclidean distance. Data is collected on a laptop computer, which has an AMD Ryzen processor, and the results of the theory and tests are discussed. Tests reveal that the Manhattan approximate distance metric is an order of magnitude faster to compute than the exact or Euclidean distance on an AMD Ryzen microprocessor even with hardware support for computing square roots. For this reason, it may be preferable to use the Manhattan approximate distance metric—especially in the face of Big Data—and, depending on the application, the approximate metric, oddly enough, may be more accurate.

Mobile Mapping Solutions for Asset Management, Engineering Design, and Disaster
Angie Swirski, Mapping/GIS Sales Manager, Navigation Electronics, Inc., Lafayette, LA

ABSTRACT TEXT: Mobile mapping solutions have been increasingly utilized in survey and mapping industries for the collections of assets, planning and design, and disaster management. This presentation will educate on how collecting high resolution imagery and LiDAR from vehicle mounted platforms improves workflow and reduces field and process time. Specific case studies will be highlighted showing the collection process for each platform and how it adds value beyond traditional survey and mapping techniques.

Spatial Analysis of Urban Fabric in Place-Based Context: Social Capital & Crime
Yunwoo Nam, PhD, GISP, Associate Professor, University of Nebraska-Lincoln, Lincoln, NE

ABSTRACT TEXT: While there are various factors that matter with spatial variations of neighborhood inequalities in an urban area, this study is particularly interested in social capital related outcomes and their impact on crime. Social capital has been applied in a variety of contexts to explain the ability of a community to solve the problem of collective action. The spatial dimension of social capital arises from the fact that their value and the way they are valuable to an individual depends on the physical distance. Social ties/networks may be restricted by the geographic location. Thus social capital is location specific.

The paper examines the interconnectedness and spatial dynamics among social capital, civic participation and crime, using GIS and statistical models. The research question is “Do social capital and civic participation contribute to neighborhood outcome (i.e., lower crime rate)?” In doing so, we propose and examine effectiveness of novel measures of social capital related neighborhood outcomes. The spatial dynamics of social indicators are analyzed at a finer level of analysis such as parcel and street level. The fast development of GIS removes former barriers to increasing spatial resolution, and the improvement of statistical modeling supports spatial data analysis of the research to be better worked. For empirical testing, SEM and Path models are utilized.

The findings show that place based social capital and civic participation are strongly associated with spatial variation of neighborhood outcome - crime. To identify implication for public policy, the paper discusses environmental strategies to promote positive social effects.
Park Redevelopment Changes in Blight Fines in a Post-industrial Community
Myra Tetteh, MPP, PhD Candidate, University of Michigan School of Public Health, Detroit, MI

ABSTRACT TEXT: Background: Blighted residential properties create problems for nearby residents. They create unsafe spaces that deter physical activity, house rodents, and invite crime. Conjecture leads municipal governments to believe that beautification projects will result in multiple changes in a neighborhood, including reductions in nearby blight. Quantitative, point-sourced data is rarely used to assess differences before and after a greening intervention, due to multiple factors including the unavailability of the data, the lack of methodological skills of municipal staff, and staff time constraints.

Objectives: The city of Detroit, like other post-industrial urban communities, is investing millions into park redevelopment. This research uses both spatial and statistical methods to investigate changes in reported blight one-year following park redevelopment using point-sourced data in the city of Detroit. It is hypothesized that the number of blight fines will decrease in communities with redeveloped parks compared to matched park communities that have not been redeveloped.

Methods: Using ArcGIS 10.4.1 for Windows, redeveloped parks (n=35) and undeveloped matched parks (n=70) were joined to neighborhoods as defined by census tracts (n=298) in Detroit. Objectively measured citywide blight fines for one-year prior and one-year following redevelopment were obtained from the city of Detroit Open Data Portal. These blight incidents were geocoded to census tracts of the park neighborhoods. This joint data was converted to a monthly average of the number of blight fines for one year pre- and post-redevelopment. A between-group design with repeated measures using a linear mixed model analyzed the data. Following the mixed model, a spatial lag model was used to assess if the relationship holds given the presence of spatial autocorrelation.

Results: Preliminary data analyses suggest that the average number of monthly blight fines decreases in the year following redevelopment in park redevelopment communities when compared to undeveloped communities. Further, blight fines in matched communities one-year after the redevelopment period will continue along its same trend.

Conclusions: While one of many factors, this work adds to the literature of the relationship between park redevelopment and blight in post-industrial cities, indicating that park redevelopment is correlated blight. This correlation could indicate that greening parks have a spillover effect into local communities and therefore, practitioners could consider this spillover effect when planning future greening projects.

Learning Objectives:
- Design a research study using combined spatial and statistical methods to assess the changes of a health-related issue in an urban community;
- Adapt methods into a concise and feasible fashion for practice; and
- Formulate directions for further research.
Addresses and Geographic Names as Spatial Reference Systems
Martha Wells, GISP, Consultant, Spatial Focus LLC, University Park, MD

ABSTRACT TEXT: There are four types of spatial reference systems: coordinate reference systems, linear reference systems, address reference systems, and geographic names (gazetteers). This presentation will look at the two most commonly-used and least documented of the four: address reference systems and geographic names.

There are three types of address reference systems. The presentation will review the rules and elements needed to define them (from FGDC address data standard section 2.4.1):

1. Identification: ID, name, authority, extent, type, reference documents
2. Designation of house numbers, street names, and place names
3. Spatial definition the address numbering grid: origin point, axes, breakpoints, breaklines, and polygons.

Geographic names include place names, landmark names, and subaddress names/identifiers. Alone, a geographic name identifies a location but conveys no idea of where the location is. In combination, geographic names form a hierarchy that allows one to zero in on a location with increasing precision, from large (country, state) to small (subaddress). Each name must be unique within the area covered by the next larger name. This presentation will set out the rules and elements by which we construct and use the three categories of geographic names: their internal structures, attributes, spatial rules, data rules, and relation to addresses.

California Wildfires: Effects on the Communities within the High Risk Vulnerable
Shobha Sriharan, Professor of Environmental Science, Virginia State University, Petersburg, VA

ABSTRACT TEXT: Every year, homes, buildings, and small towns are destroyed by wildfires. California has the highest occurrence of wildfires due to the dry air and grasses. Recent California wildfires which caused great damage in 2018 are: the Camp Fire near Chico in Northern California, and the Woolsey and Hill Fires burning tens of thousands of acres across Southern California. In Southern California, the Woolsey Fire has destroyed parts of the city of Malibu and many high-profile celebrity homes, as well as inland communities from Oak Park to Calabasas.

The northern counties and coastal areas of California usually have a higher risk for wildfires. Some of those counties (all have a 50% or higher of high and extreme risk of wildfires) include Alpine, Amador, Calaveras, El Dorado, Lake, Lassen, Mariposa, Mendocino, Mono, Nevada, Plumas, Santa Cruz, Sierra, Siskiyou, Trinity, and Tuolumne. Nearly 29 million Americans live in census tracts with a moderate to very high potential for high-intensity wildfires. White Americans, who constitute 72% of the United States, make up 76% of these census tracts and the population is not, for the most part, socially vulnerable. This suggests that environmental amenities and fire insurance facilitate the settlement of more advantaged families in these areas. However, 12.4 million people living in census tracts with poor adaptive capacity and lower income are potentially vulnerable for wildfires. There is some correlation between social vulnerability and race/ethnicity and lower real-estate prices in some fire-prone areas explain higher numbers of socially vulnerable populations in these locations.