MS-GIST In Person
Master Projects 2020 Cohort
Thursday April 30th – Livestream via Zoom

*** There will be 5 minute breaks between each presentation to facilitate transitions in Zoom.**

**** Zoom links available on a per request basis. Contact: atgrogan@email.arizona.edu**

Date/Time	Title	Person *
04/30/2020 6:00 – 6:20 pm	The future of Miami, Florida: Flood Risk Modeling for Sea-Level Rise	Jacqueline Kramer
04/30/2020 6:25 – 6:45 pm	Examining the Use of UAV Imagery for Population and Canopy Height Estimates of Cotton Varieties	Nick Bisley
04/30/2020 6:50 – 7:10 pm	Quantifying Woody Cover Change in the Malpai Region from 2007 to 2019 Using Wildfire and Fine Spatial Resolution Remotely Sensed Data	Cody Wooden
04/30/2020 7:15 – 7:35 pm	How One Magnet School Plans to Use Geographic Information Systems to Advertise, Recruit, and Achieve Ethnic and Racial Diversity in Its Student Population	Trevor Salago
04/30/2020 7:40 – 8:00 pm	Buffelgrass: A Comparison of Manually Collected Environmental Variables and GIS Spatial Data Using Digital Elevation Models	Scott Linhart
04/30/2020 8:05 – 8:25 pm	Digitizing Early Sanborn Maps of Tucson, AZ	Elaine Bridgewater

The Future of Miami, Florida: Flood Risk Modeling for Sea-Level Rise

Jacqueline Kramer
jacquelinekramer@email.arizona.edu

Abstract:

Southeastern Florida is especially prone to flood disaster due to low elevation, frequent heavy rainfall and storm surge events, and a higher-than-average trend in sea-level rise, amongst many other risk factors. Since Miami, Florida is the most economically vulnerable coastal city in the United States, risk management for near-future flooding events is becoming increasingly important. The purpose of this project is to provide a flood impact prediction model for Miami in the year 2040. This project models flood inundation to Miami's critical infrastructure based on a range of flooding events likely to occur by 2040 under moderate to high Representative Concentration Pathways (RCPs) scenarios. This project compares a flood risk assessment to the socioeconomic status of Miami's census tracts. Floodwater levels used in this study range from 6-inches to 20-feet above ground level (AGL), but focus on thresholds which would be caused by an average heavy rainfall event, an annual high-water mark flood event, and an extreme flood event—all with 12 inches of additional water heights to account for sea-level rise in the year 2040. The resulting flood model shows that under the new high-water mark of 4 ft., 8 of the critical infrastructures will be impacted in contrast to only 1 building affected under current conditions. Flood risk maps indicate that the highest income households in downtown Miami and Miami Beach fall within the highest risk zones. Results display impacts to Miami's critical building infrastructure and socioeconomic populations to provide insight for future development and evacuation planning.

Keywords: Flood Model, Flood Prediction, Miami, Sea-Level Rise

Examining the Use of UAV Imagery for Population and Canopy Height Estimates of Cotton Varieties

Nick Bisley
bisley@email.arizona.edu

Abstract:

Agricultural products are a necessary part of our modern lives. From ancient times, farmers have been aware of the spatial variability that they must work with in their agricultural systems. The modern advances in technology and the application to environmental sectors has led to the development of precision agriculture systems. Emerging tools that are based on these technological advancements are Unmanned Aerial Vehicles (UAVs). This paper examines the functionality of using UAV-based imagery to complete typical scouting tasks, associated with a cotton variety trial in Marana, Arizona. Remotely sensed image processing techniques and analysis resulted in the successful creation of population estimates and canopy height models, for cotton varieties and related data to harvested yield. The population estimates resulted in a classification accuracy of 86.5%. The Canopy Height Models generated produced an absolute error of 11.3cm and 2.9cm for July 3rd and July 30th, respectively. Height data were strongly correlated to harvested yield and estimated population. Cotton with the greatest height change from July 3rd to the 30th had a lower estimated population and had lower harvested yield. While cotton varieties with a smaller height change during that period, had higher estimated populations and a higher harvested yield. According to this study, there did not appear to be a significant correlation between the estimated population and the harvested yield. The results of this study show that a UAV is a valuable tool for gathering large scale scouting data in a commercial cotton variety trial.

Keywords: UAV, Agriculture, Cotton, Remote Sensing, Population Estimate, Canopy Height Model

Quantifying Woody Cover Change in the Malpai Region from 2007 to 2019 Using Wildfire and Fine Spatial Resolution Remotely Sensed Data

Cody Wooden

cwooden@email.arizona.edu

Abstract:

Grassland ecosystems across the world are experiencing various levels of encroachment from woody shrubs over the last two centuries. In the southwestern United States, several factors such as intensive herbivory and wildfire management, are contributing to this phenomenon which are typically more pronounced in desert rangelands. Quantifying the spread of woody cover is crucial in understanding which factors, such as wildfire or intense herbivory, contribute to land cover change over time in historic grasslands within the Malpai Region of Arizona and New Mexico. However, distinct changes in vegetation across large landscapes are difficult to fully assess without the capability of modern aerial imagery. For this project, high-resolution imagery from the National Agricultural Imagery Program is used to classify land cover and quantify the change in woody cover from 2007 until 2019. In this region, the annual presence of wildfire and subsequent management strategies are thought to affect the expansion of woody cover. In order to display changes, I am also overlaying the land cover change results with select wildfire boundaries from the past twenty years that occurred in areas exhibiting notable woody cover change. With a relatively short timeframe when regional N.A.I.P. imagery was available, changes in woody cover proved slight while wildfire effects on vegetation were varied across such the vast and diverse study area where these analyses were focused.

Keywords:

Encroachment, rangelands, wildfire, Malpai, remote sensing, classification

How One Magnet School Plans to Use Geographic Information Systems to Advertise, Recruit, and Achieve Ethnic and Racial Diversity in Its Student Population

Trevor Salago

TrevSalago@email.arizona.edu

Abstract:

Magnet schools specialize on program themes to attract parents and students to increase ethnic and racial diversity in student populations. This research project showcases how Geographic Information Systems (GIS) helps one magnet school from Tucson Unified School District in Tucson, Arizona. Holladay Magnet Elementary School offers a school-wide visual and performing arts magnet theme. The Generate Service Area Tool from ArcGIS Pro creates walking and driving service areas to the school site for these analyses. The analyses use demographic data from the 2017 American Community Survey from the United States Census Bureau website. This project emphasizes on the elementary age group of 5 – 9-year-olds. The project uses data on population groups from the Hispanic or Latino (of any race), Not Hispanic or Latino – White alone, Not Hispanic or Latino – Black or African American alone, Not Hispanic or Latino – American Indian or Alaskan Native alone, Not Hispanic or Latino – Asian alone, and Not Hispanic or Latino – Multi-racial group. For this research, the Not Hispanic or Latino – Multi-racial group includes Not Hispanic or Latino – Native Hawaiian or Other Pacific Islander alone, Not Hispanic or Latino – Some other race alone, and Not Hispanic or Latino – Two or more races. The walking and driving service areas for Holladay details optimal areas to advertise and recruit for its visual and performing arts magnet theme. GIS and demographic data provide one magnet school a way to target population groups to achieve its goal to maintain a diverse student population.

Keywords:
Generate Service Area Tool, Community Analyst, ArcGIS Pro, Magnet Schools

Buffelgrass: A Comparison of Manually Collected Environmental Variables and GIS Spatial Data Using Digital Elevation Models

Scott Linhart

salinhart@email.arizona.edu

Abstract:

Buffelgrass is an invasive species found in the Sonoran Desert, which creates vulnerability among native fauna through land expansion and more frequent fire regimes. Eradication methods developed by land management and volunteer programs have created control methods along with data collection to mitigate invasive species growth. Volunteers collected data for specific environmental variables, including slope, aspect, and elevation, that were then categorized and measured upon the location of identified buffelgrass in the Tucson Mountains. An efficient data workflow is crucial in bolstering buffelgrass eradication programs, so we investigated online GIS data to find interchangeable solutions to create a streamlined process and reduce the burden of manual data collected by volunteers. The study explores the most effective methods to obtain environmental attributes through publicly assessed GIS data of different spatial resolutions so that we can compare the spatial data with field data. Digital elevation model (DEMs) maps of 1 M., 10 M., and 30 M. resolution were downloaded and used to conduct slope, aspect, and elevation analysis. The spatial data values were then compared to manually collected data to determine if there was a significant correlation through statistical analysis in RStudio. An ANOVA statistical analysis calculated the environmental attributes between both datasets, and the results demonstrated that this process could create a streamlined buffelgrass GIS database for environmental features, therefore reducing the need for labor-intensive manual data collection. Furthermore, the research could improve the development of buffelgrass eradication techniques and would be advantageous for land management to remove the species.

Keywords:

Buffelgrass, Digital Elevation Models, Tucson Mountains

Digitizing Early Sanborn Maps of Tucson, Az

Elaine Bridgewater
Ebridgewater@eamil.arizona.edu

Abstract:

The Sanborn Map Company published its first maps of urban America in 1866. These maps were updated every few years until 1970, and although originally intended to allow the fire insurance company to assess its total liability in urbanized area of the United States, "captured the architecture of the area under study and are invaluable for documenting changes in the built environment." (Wikipedia). Sanborn maps of the Tucson area were available to download from the Library of Congress on their website. The Sanborn Co, color coded the maps to represent building materials and symbols with various attributes. For example, the number of windows, the stories of the building and the roof all have specific symbols. The primary focus of this project was to create a geodatabase of these maps of the Tucson area focusing on the material used and the use of the building. By using the Sanborn Maps and the ESRI products ArcGIS and ArcGIS Online, I was able to create a digital information source available for use in ArcOnline through the University of Arizona Library website. Examples of other Sanborn digital map products include the websites of the University of California Los Angeles and the University of Southern California Library. The resulting online product is easily accessible, interactive and easy to use. This product will provide University of Arizona students with information about the architectural history of Tucson such as the main building materials used in the 1880s. What's more, this project will provide resources for other universities or organizations that are trying to produce similar products based on available Sanborn maps.

Keywords:

Sanborn Maps, Tucson, ArcGIS PRO, ArcGIS Online