

MS-GIST Projects Fall 2022

Monday, December 12

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

*** Zoom links are available on request. Please contact Andrew Grogan - atgrogan@arizona.edu*

Date/Time	Presentation Title	Student Name
12/12/22 11:00 - 11:25 AM	<u>Geographic Information Systems (GIS) Enhanced Community Communication: Improving Public Health</u>	Patrick Stanley
12/12/22 11:30 - 11:55 AM	<u>Retrospective Landcover Analysis of Urban Growth and Deforestation in Flagstaff, AZ Using Automated Classification Methods on Landsat Surface Reflectance Imagery</u>	Zachary Gerber
12/12/22 12:00 - 12:25 PM	<u>Cost Distance Analysis of Pueblo III Trade Routes within the Four Corners Region</u>	Maggie Banks
12/12/22 01:30 - 01:55 PM	<u>Integration Of Geographic Information Systems Technology and Flood Analysis for Geological And Social-Economic Hazards on the Navajo Nation</u>	Letyraial Cunningham

Geographic Information Systems (GIS) Enhanced Community Communication: Improving Public Health

Patrick Stanley
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12/12/22, 11:00 - 11:25 AM

Abstract:

Local governments need to develop technologies for analyzing and maintaining the health of their cities and improving the reporting and communication of incidents with their citizens. A user-friendly mobile application using location services with the ability for citizens to easily report incidents and for local governments to distribute resources is needed. City governments need a method of locating issues, increasing accountability, and allocating resources. At the same time, citizens need a way to voice their concerns without having to navigate the maze of government departments. To address this problem, a prototype of a mobile application and a dashboard was constructed using GIS technologies. To assist with the creation of the prototype, multiple departments within the city of San Ramon, California were contacted to provide data on their prior experiences as well as their current needs. The resulting prototype application and dashboard allow multiple city departments to access the incident database including photographs and submitter comments, while also having the ability to view the various GIS attributes of the incident location using cartographical technologies. Use of a system with GIS functionality allows users to effortlessly communicate incidents of concern and at the same time allows local governments to more efficiently and transparently allocate public resources.

Keywords: Public Health, GIS technologies, Database, Application, Dashboard, Cartographical technologies

Methods on Landsat Surface Reflectance Imagery

Zachary Gerber
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12/12/22, 11:30 - 11:55 PM

Abstract:

In this project, I describe a method for automating historical land use/land cover change analysis for the Northern Arizona, greater Flagstaff area. The method investigates deforestation as a result of urban growth, the results of which are displayed in a timeseries. The area surrounding Flagstaff, Arizona is interspersed with areas of urban development as well as a diverse population of spruce, fir, and pine trees. In recent years, more forest and grassland areas have been removed to make room for more urban development, both within and outside the city limits. I obtained one surface reflectance raster image per year taken in Spring from 2022 back through 2000. These images were obtained from the United States Geological Survey Earth Explorer data collection and were captured by the Landsat 8 Operational Land Imager/Thermal Infrared Sensor and Landsat 5 Thematic Mapper satellites. After initial processing, scenes were classified using an unsupervised ISO Cluster classification technique. The land cover classifications were identified via manual interpretation techniques aided by high-resolution, Google Earth historical imagery. Analysis of these classifications provided land use and land cover data for understanding the recent extent of urbanization and deforestation in this region. The results of this study demonstrate approximately 3,946.6 acres of forest were lost to urban development, between 2000 and 2022, which equates to a 15.44% loss in forest acreage. In addition, ArcGIS Pro Model Builder models were developed to allow for a reproducible method of performing similar analyses in other study areas.

Keywords: Landcover Analysis, Urban Growth, Deforestation, Automation, Surface Reflectance Imagery

Cost Distance Analysis of Pueblo III Trade Routes within the Four Corners Region

Maggie Banks
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12/12/22, 12:00 - 12:25 PM

Abstract:

The research to trace the trading of goods between people in the American southwest for thousands of years is very well documented showing how goods have moved across the landscape and what was traded between various communities. However, the actual trade routes themselves remain unclear. This study uses archeological GIS data of Pueblo III sites in the Four Corners region and Digital Elevation Models to perform a GIS Optimal Path Analysis that determines the least cost path taken from ten separate known Pueblo III Sites to Cliff Palace in Mesa Verde National Monument. These sites are: Atsinna Pueblo in El Morro National Monument, Aztec Ruins, Bandelier National Monument, Horse Collar Ruin in Natural Bridges National Monument, Keet Seel Pueblo in Navajo National Monument, Little Canyon Ruin in Hovenweep National Monument, Pueblo Bonito in Chaco Canyon, Sand Canyon Pueblo, White House Ruin in Canyon de Chelly National Monument, and Yucca House National Monument. The study concluded, that most travel done between the sites required the ability to cross the San Juan, Mancos, and Animas Rivers, sometimes more than once. Additionally, that routes were and did go straight over the canyon cliff faces. Finding ancient trade routes in the four corners region would not only increase the knowledge of how people were traversing the varied geography, but also potentially locate new sites to protect for the future.

Keywords: GIS, DEM, cost path, optimal path, archeology

Integration Of Geographic Information Systems Technology and Flood Analysis for Geological And Social-Economic Hazards on the Navajo Nation

Letyraial Cunningham
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12/12/22, 01:30 - 01:55 PM

Abstract:

Flooding events have caused many considerable losses to individuals and businesses all over the United States. Floods are the most frequent severe weather threat and the costliest natural disaster in the nation. Ninety percent of all natural disasters in the country involve flooding. In order to effectively mitigate and prevent flood disasters, flood risk and flood management needs to be implemented in areas that are vulnerable and susceptible to flooding. The area of study will be the Navajo Nation region in the state of Arizona. Analysis and evaluation of flooding events near Marble Canyon and the city of Winslow between the years 2010 and 2020 are the main objectives of this project. Flood susceptibility analysis in ArcGIS Pro can determine the risk of flooding near these areas and how it affects their geology and economy. Major flooding of these areas has caused severe damage to roads, homes, crops, businesses, schools, hospitals, and emergency services. The following factors are included in the flood analysis; slope, hydrology, rainfall, and land cover. Using the reclassify and weighted overlay tools in ArcGIS Pro for each of these factors, a flood risk map of each area shows the severity of flood risk. Each flood risk area has an allocated value from "very low," "low," "medium," "high", and "very high" flood risk. This shows what areas are more vulnerable than others in both regions of the Navajo Nation. These results can be used to highlight areas that require planning and action to avoid or mitigate damages and loss of lives.

Keywords: Flood, Flood disaster, Flood analysis, Flood risk, Navajo Nation.