MS-GIST Projects Fall 2022
Friday, December 09

**** 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
12/09/22 04:00 - 04:25 PM	The spatial relationship between North American Manatee and Industrial Power Plants	Jessica Goff
12/09/22 04:30 - 04:55 PM	Analyzing the Relationship between Crime and Tree Canopy in Austin, Texas	Abraham Gonzalez
12/09/22 05:00 - 05:25 PM	Normalized Burn Ratio (NBR) and Normalized Difference Vegetation Index (NDVI) Study of Vegetation Health and Regrowth Rate Post 2018 Mendocino Complex Fire in Northern California Coastal Mountains	Matt Boden
12/09/22 05:30 - 05:55 PM	Effects of Redlining in the Twin Cities	Timothy Crowe

The spatial relationship between North American Manatee and Industrial Power Plants

Jessica Goff
jessicagoff@arizona.edu

12/09/22, 04:00 - 04:25 PM

Abstract:

The NPR podcast series Planet Money published a special series titled How Florida's manatees got hooked on fossil fuels, it talked about how manatees in Florida were dependent on the hot water that power plants are releasing into the ocean and how that might be a cause for an increase in manatee populations. This poses an interesting environmental industrial relation predicament where manatees are in danger of extinction and power plants might be a solution to saving this species, but power plants are also part of environmental degradation and climate change. This study looks at the relationship between power plant sites and observed manatee locations as well at manatee recovery locations throughout the state of Florida. A spatial regression and hot spot analysis will help understand distribution of manatees and power plants. Point data sets for years 1991-2019 were used to create density map, hot and cold spot analysis, and regression analysis that concluded that manatees do conjugate around industrial power plants. However, manatees do cluster more around natural gas power plants as compared to Florida's other leading power plant facilities.

Keywords: Manatee, Power Plants, Climate Change, Spatial Regression, Hot Spot Analysis

Analyzing the Relationship between Crime and Tree Canopy in Austin, Texas

Abraham Gonzalez
agonzalez111@arizona.edu

12/09/22, 04:30 - 04:55 PM

Abstract:

The purpose of this project is to analyze the relationship between tree canopy and violent crime in the city of Austin, Texas. Using only recent 2022 data on violent crime and the most up-to-date data on tree inventory in Austin, heat maps were generated to assess the density of each data source. A tree priority data map was also used to build upon by joining the crime data to it and creating a bivariate choropleth map from the output. Median Household Income was analyzed against crime to determine whether low-income households are areas that might benefit the most from the planting of more trees. Furthermore, a Pareto (80/20) analysis was created, where violent crimes were aggregated based on the closest input comparison polygon feature. Police station locations, policing districts, and parkways were also used to provide background features when analyzing the results. Data came mostly from the Austin Texas Open Data Portal and from the US Census Bureau. Preliminary results show an inverse relationship between tree canopy and crime rates. Ergo, where crime rate was high, tree priority in that area was also high. Results also indicate that the low-income households are in high need of tree priority compared to higher-income households. The results described in this analysis can help identify areas that may require more extensive attention from law enforcement agencies and establish better community effort to plant more trees in Austin.

Keywords: Austin, Texas, crime, income, tree canopy, heat map

Normalized Burn Ratio (NBR) and Normalized Difference Vegetation Index (NDVI) Study of Vegetation Health and Regrowth Rate Post 2018 Mendocino Complex Fire in Northern California Coastal Mountains

Matt Boden
mboden@arizona.edu

12/09/22, 05:00 - 05:25 PM

Abstract:

The Mendocino Complex fire burned for two months from July 27th 2018 to September 18th 2018. The Mendocino Complex fire comprised of two fires: the River and the Ranch fire. Both wildfires burned 459,136 acres of the Mendocino National Forest in the Northern Coast Range of northwestern California. This study tries to measure the impacts and understand the forest structure and recovery through the use of Landsat 8 imagery to analyze Normalized Burn Ratio (NBR), Normalized Difference Vegetation Index (NDVI). NDVI is calculated to understand the impacts to the vegetation health and was studied to understand which index would provide the best results for the study area. The NBR was calculated to understand the overall burn severity in the study area. To understand the impact to the specific types of vegetation, 50 evenly distributed control points were established across the five dominant vegetation types that make up 95% of the study area. There is a positive correlation between the dNBR and dNDVI with an R^2 of 0.8635. The dNBR indicated that the vast majority of the burn area was a low to moderate severity burn. Post fire NBR and NDVI showed that over the five vegetation types shrubland observed the highest post fire loss in terms of reflectance values, -122.75% and -78.67% respectively. May 28, 2020 NDVI showed the largest increase of NDVI values across all control points with an average of 0.228 up from 0.117 for a 95% increase from one month post fire in 2018, thus proving that the forest is in its early stages of recovery.

Keywords: Normalized Burn Ratio, Normalized Differenced Vegetation Index, Differenced Normalized Burn Ratio

Effects of Redlining in the Twin Cities

Timothy Crowe
tscrowe@arizona.edu

12/09/22, 05:30 - 05:55 PM

Abstract:

The depression era Home Owners' Loan Corporation (HOLC) bought troubled mortgages from banks and refinanced mortgages with borrowers directly. The HOLC also graded neighborhoods by risk of mortgage default using racist criteria in a process now commonly called redlining. Recent scholarship indicates that redlining resulted in adverse socioeconomic conditions in the decades since the depression. This study examines the possible long-term effects of redlining in the Twin Cities, Minneapolis and St. Paul, Minnesota, using decennial census and American Community Survey data. Trends were identified using socioeconomic measures at the census tract level in four areas: population, housing, labor force and employment, and income. Analysis including geographically weighted regression identified significant variation in measures between best and worst rated tracts. As a percentage of a tract's population, non-White population grew while the White population declined. However, non-White population grew mostly in census tracts with the lowest HOLC grades. Home values in the lowest graded tracts increased over time yet lagged well behind better graded areas. Median rents in worst graded tracts doubled when compared to other tracts. The best graded area outpaced median income growth in all other tracts. Generally, the influence of HOLC grades was less in later census years. While regression analysis of median home value using the selected census data failed to provide a reliable predictive model, useful explanatory variables were identified for future study. Overall, the results show that multiple adverse socioeconomic conditions continue to exist in formerly redlined areas.

Keywords: redlining, HOLC, census, Minnesota, Minneapolis, St. Paul, socioeconomic trends