MS-GIST
Master Projects Summer 2021
Monday August 9th (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 *
08/09/2021 **4:00 – 4:30 pm**	**Does Geographic Location Play a Role in Horse Track Deaths?**	**Laura J Seay**
08/09/2021 **4:30 – 5:00 pm**	**Tackling Tree Inequity: Social and Economic Predictors of Urban Tree Canopy in Tucson, AZ**	**Jessica "Cait" Boyer**
08/09/2021 **5:00 – 5:30 pm**	**Southern Sierra Nevada Backpacking Route Planner**	**Hilary Dufour**
08/09/2021 **6:00 – 6:30 pm**	**Advanced and Spatial Statistics in High School Basketball**	**Jordan Michael Reigelsperger**
08/09/2021 **6:30 – 7:00 pm**	**Wildfire Hazardous Fuel Reduction in Fry Fire District, Cochise County, AZ**	**Pauline Loftus**

Does Geographic Location Play a Role in Horse Track Deaths?

Laura J. Seay
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Abstract:

Horse racing in the United States has been around since 1665, but seriously took off after the Civil War in 1868. The sport has always been dangerous, with most of those dangers being manmade. One of the most widely discussed aspects is administering drugs to the racehorses. While drugs may play a part in the number of injuries sustained by the horses, the questions being asked in this project focus on the natural environment surrounding the racing rather than the artificial environment created by man. Does geographic location and climate play a role in horse track fatalities? Data, including number of races per month and fatalities per year, was collected along with specific climate data for each racetrack location from Jan 2009 through December 2020. Associations between environmental conditions and horse track fatalities were tested using linear regression modeling. Racetrack locations on the west coast were compared to their east coast counterparts. Northern tracks were compared to southern tracks. Through all comparisons, there does not appear to be a strong connection between the geographic locations of the racetracks and the fatalities reported each year. More analysis to determine geographical and environmental factors of horse track fatalities is needed.

Keywords:

Racehorse, Horse Deaths, United States, Weather, Geography

Tackling Tree Inequity: Social and Economic Predictors of Urban Tree Canopy in Tucson, AZ

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Abstract:

Urban tree canopy (UTC) provides essential ecosystem services to cities, from improving human wellbeing and health to reducing the urban heat island effect. However, previous studies have shown that tree canopy is often inequitably distributed. In 2019, Tucson was named the 3rd fastest warming city in the United States. In response, the city government implemented the Tucson Million Trees initiative to help mitigate rising temperatures in the desert city. In an effort to make tree canopy more equitable, this study intends to determine what factors contribute to tree inequity in Tucson so that these factors can be considered in decision-making for tree-planting locations. Using existing data from the Pima Association of Governments, average tree canopy in each census block group was determined. This tree canopy data was tested against 13 variables commonly associated with tree inequity using exploratory regression. Regression analysis identified a seven-variable model with positive correlations between average tree canopy and population density, median household income, percent rental households, white population, and vacant households. The model showed negative correlations between tree canopy and households with 7 or more residents, and median structure age. We hope that the results of this study can guide decision makers within the Tucson city government to prioritize block groups using the variables identified as predictors of tree canopy

Keywords:

Urban Tree Canopy, Spatial Regression, Global Warming, Tree Inequity, Vulnerability

Southern Sierra Nevada Backpacking Route Planner

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Abstract:

The process for planning backpacking trips in California's Sierra Nevada mountain range takes into account a multitude of geographic data, which is dispersed across multiple sites. This dispersal makes the process laborious. Wilderness permits are linked to trailheads and reserved online through Recreation.Gov or Yosemite Conservancy, which lack sufficient spatial information required for planning. I developed an ArcGIS WebAppBuilder application for backpacking route planning in the Inyo National Forest, Yosemite, Kings Canyon and Sequoia National Park. The application was developed through data gathering and vetting, geoprocessing and digitizing, use of geometric networks, Arcade expressions, Python, web maps and ESRI WebAppBuilder (WAB). Data is centralized from various sources and enhanced in ways that make it easily consumable in a web application format. Widgets are utilized for simple filtering and viewing of layers such as trails and trailheads. It is a much-needed solution for planning wilderness travel in the Southern Sierra Nevada

Keywords:

WebAppBuilder, Backpacking, Route Planning, Wilderness Travel, Web Application

Advanced and Spatial Statistics in High School Basketball

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Abstract:

Sports analytics in professional basketball leagues, such as the National Basketball Association (NBA), have transformed their respective leagues by introducing new statistical measures to quantify individual player and team performance. NBA organizations have teams of personnel and dedicated analytics departments dedicated to analysis. However, high schools generally do not. Thus, revolutionary statistical measures are not available to the programs serving as the foundation for professional leagues. Data from a five-game stretch of the 2020-2021 varsity boys' basketball season was utilized to provide a high school with advanced statistical measures to evaluate individual player and team performance. A review and plotting of game-tape from the sample was performed, followed by the calculation of advanced and spatial statistics. The advanced statistics revealed that during the sample individual players and the team were less efficient than their professional counterparts in all areas. The relative inefficiency is attributed to a lack of 3-point shots, the result of 3-point shots when taken, and the prevalence of inefficient shot attempts. The result of 3-point shots when taken being less efficient was expected due to the disparity of individual player skill that exists between high school, collegiate and professional basketball players. Spatial statistics, though hindered by small sample size, revealed clustering of efficient field goal attempts near the basket and low clustering of corner 3-point field goal attempts, another efficient attempt. As a pilot study, the findings of this capstone can be used to illuminate patterns and trends, as well as efficiencies and inefficiencies to improve upon.

Keywords:

Basketball, Statistics, Spatial Statistics, High School, Range, Spread, Ripley

Wildfire Hazardous Fuel Reduction in Fry Fire District, Cochise County, AZ

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Abstract:

Wildfire in the Southwestern United States is an escalating problem for residents and managers to contend with, particularly for those living and working in the Wildland Urban Interface (WUI). Fuel management mitigates the cost of wildfire suppression and protects people and assets. In the Fry Fire District, grants from the Arizona State Department of Forestry and Fire enable collaboration between the district and private landowners in fuel reduction with mechanical thinning and controlled burns. In this study, GIS tools were used to analyze multiple seasonal images from Landsat 8 Surface Reflectance data. The acquired images were corrected for cloud cover and cloud shadow. The change in Normalized Difference Vegetation Index (dNDVI) and change in Normalized Burn Ratio (dNBR) were then calculated to assess density and recovery. The analysis process was automated using Modelbuilder in ArcGIS Pro to aid managers in any area process results faster and facilitate assessment of various landscapes. Managing fuels, particularly in the WUI, can help mitigate the extremity, intensity, suppression cost, and loss of life and property resulting from wildfires.

Keywords:

Fry Fire District, Cochise County, Hazardous Fuel Reduction, NDVI, NBR