**MS-GIST Online**
**Master Projects 2019 Cohort**
**Friday December 6th – Livestream via Zoom**

*** Click presenter's name to access the live Zoom stream of their presentation at the scheduled time**

| Date/Time | Title | Person * |
|---|---|---|
| 12/06/2019<br>10 – 10:30 am | Mapping Fault Locations and Analysis in Electric Transmission Networks | Adam Culver |
| 12/0/2019<br>11:00 – 11:30 am | A Cultural Resource Model for the Bradshaw Ranger District, Prescott National Forest, Yavapai County, Arizona | Carlos Herrera |
| 12/06/2019<br>12:00 – 12:30 pm | Updating 911 Address Points, Using AI-Generated Building Footprints for Cochise County, Arizona | Emma L. Williams |
| 12/06/2019<br>2:00 – 2:30 pm | Automated Sidewalk Mapping | Caleb Tucker |
| 12/06/2019<br>4:30 – 5:00 pm | Recent Violent Crime Dynamics in Spatial Patterns in Albuquerque, New Mexico | Dustin Schiffer |

**Mapping Fault Locations and Analysis in Electric Transmission Networks**

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**Abstract:**

Electrical faults in a transmission network can cause serious issues from financial fines, equipment failure, unplanned outages, and in some cases fatalities. Faults need to be quickly identified and resolved to minimize damage. This project presents a tool for users to estimate the area where the field crews should search first for any physical interference to the circuit. This tool was built in an Esri environment using ModelBuilder using very limited and basic geoprocessing tools so that other companies not using a connected geometric network could replicate the process easily. This initial project investigates three specific fault events, in which no prior knowledge of where or what caused these faults. After executing the tool, the faults are investigated in the protection database where the root cause and locations are stored; all three events had different results. The model uses user defined parameters for a search distance from the estimated fault location determined by a reading from distance fault recorders at substations. In areas where the fault was closer to the substation, a smaller search radius could be used whereas in areas farther from the substation a wider radius needs to be applied. This tool will provide clarity on where electrical faults occur in the field for utilities with smaller datasets, limited budgets, and basic data models.

**Keywords:** Electrical Faults, Fault Location, and Electric Transmission, ModelBuilder

**A Cultural Resource Model for the Bradshaw Ranger District, Prescott National Forest, Yavapai County, Arizona**

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**Abstract:**

Hazardous fuels reduction is a critical part of the mission for federal land management agencies such as the US Forest Service, National Park Service, and the Bureau of Land Management. Following federal regulations, fire personnel acquire clearances from agency specialists including forestry, soils, hydrology, ecology, minerals, archaeology, and wildlife. To maximize value, archaeologists utilize spatial models showing known and predictive locations for cultural resource sites to direct surveys in the best possible areas. This study focused on prehistoric and historic site densities in the Bradshaw Ranger District, Prescott National Forest. This study used known point site locations from the US Forest Service along with existing survey and aggregated Potential Natural Vegetation Type polygons that combine slope, vegetation, soils, and precipitation among many other attributes. Results indicated the number and type of sites archaeologists can expect to locate in a square mile area and allow them to fine tune survey strategies. The results did expose some surprises that would have normally been avoided by block survey due to slope, vegetation types, and density. Upcoming landscape-scale projects in the district will open up new funding opportunities and targets, so a site density model's utility cannot be overstated.

**Keywords:**

Cultural Resources, Spatial Modeling, Survey Strategy, Fuels Reduction, Forest Service

**Updating 911 address points, using AI-generated building footprints for Cochise County, Arizona**

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**Abstract:**

The transition to enhanced emergency call routing, for faster response times, necessitates updating 911 address points. Moving address points manually is labor-intensive. The research investigates to what extent the AI-generated Microsoft Bing building footprints layer can be used to check and reposition address points in Cochise County, Arizona, using GIS tools to conduct a series of geoprocessing steps. These test whether the address points lie on building footprints, and therefore do not need moving. Counts of address points and structures present in each parcel are compared to facilitate point classification, and to identify the best structure to move address points to. The approach identifies parcels containing multiple address points and checks for non-matching parcel situs addresses. Validation of the results is undertaken using manually-positioned test points, which are compared with the results obtained. The results provide a rapid method of identifying thousands of 911 address points that do not require moving, and constitute a cost-effective first pass at updating remaining address points for subsequent quality assurance review. Detection rates of non-matching parcel addresses and parcels containing multiple points are significantly higher than for manual analysis. Misclassification errors arise where structures not included within the Bing footprint layer are present.

**Keywords:**

911 address points, emergency response time, Bing, building footprints, AI-generated

**Automated Sidewalk Mapping**

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**Abstract:**

Sidewalks throughout urban and rural areas provide safety, mobility, and access. In response to the need to understand the existing sidewalk network and ability to analyze functions effecting or effected by sidewalks, a full sidewalk inventory is required. This report was conducted to describe the development of geospatial automated sidewalk mapping for Douglas County, Nebraska. Prior to the development of this network there were no existing Douglas County sidewalk data sets available. Data sets included full county coverage of LiDAR, for band multispectral imagery, MrSID 3-inch GSD overhead imagery, parcels vector layer, and a street centerline vector layer. An automation method was developed to identify existing sidewalks. The coding was achieved through ArcMap Model Builder using existing street and parcel data sets to eliminate extraneous data and then classify likely sidewalks. The process reduced a workload estimated to take 600-800 hours to manually digitize the county's sidewalks and completed the process at 97% accuracy using 3x3 image matrix resulting in an estimated 59 hours of processing time to automatically map the county's sidewalks. The final cartographic tool provides a method to fully map a sidewalk networks using overhead imagery, street centerlines, and parcel boundaries.

**Keywords:**

Sidewalk, Omaha, Nebraska, Pedestrian Network, Automated Mapping

**Recent Violent Crime Dynamics and Spatial Patterns in Albuquerque, New Mexico**

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**Abstract:**

This project is an analysis of violent crime in the City of Albuquerque, New Mexico. In 2014, the DOJ opened an investigation into the Albuquerque Police Department (APD) which resulted in APD's officer numbers dwindling, and making the officers that stay afraid to use their entire tool and skill set. This project uses raw data retrieved directly from APDs API to detect historical and geospatial patterns in Albuquerque crime data. It also uses complimentary data sets such as current station placement, school locations, and beat locations. Using a Pareto (82/20) analysis, cluster violent crimes were clustered together for an analysis on incident counts within a quarter mile of schools, and how far away the higher incident count buffers are from current stations. Space-Time (time-cube) analysis was applied with violent crime dates to identify areas that may be experiencing new patterns. The result were compared to the overall data that has been touted by the current city administration. This administration has claimed that crime numbers are going down. The results in this project, however, contradict these claims. The workflow and results described in this report will help identify areas that may require more extensive attention from law enforcement agencies in Albuquerque.

**Keywords:**

Albuquerque, Crime, DOJ, APD, Violence