

Session Abstracts

Using GIS for Planning the Location of Primary Healthcare centers in Jeddah City: A vector and raster-based approach

Presented by Abdulkader Murad, King Abdulaziz University

Description: The main goal of this paper is evaluating and analyzing the location and spatial distribution of health care centers in Jeddah city using ArcGIS Pro software. At first, a geodatabase was created that includes road network, population districts, primary healthcare centers supply and demand. The paper has applied several vector and raster analysis tools for the purpose of evaluating the exiting condition of healthcare center's location. Vector based tools include buffer and overlays analysis functions. In addition, raster-based tools such as straight-line distance and Kernel density were used by this paper to produce a clear spatial evaluation for the current status of health care centers supply and demand at Jeddah city.

Keywords: *GIS, Healthcare Planning, Vector Analysis, Raster Analysis, Healthcare Supply*

Estimating Imbalance and Wait Times in the Boston Bluebikes System Using Graph Neural Networks

Presented by Abdullahi Bello, Northeastern University Civil and Environmental

Description: This study develops a spatio-temporal framework to analyze, simulate, and predict station imbalance dynamics in bike-sharing systems. We examine spatial distribution and temporal patterns of trips and travel times by hour of day and day of week to detect demand variability. Using these patterns, we simulate origin–destination trips without rebalancing to estimate natural system flows and their impacts on station imbalances. Multiple operational scenarios, including varying initial station inventories and flow adjustments, are tested to evaluate their effects on network-wide imbalance ratios, station-level imbalances, average travel times, and station wait times following imbalance events. A spatio-temporal prediction model combining a GCN and GRU is developed to predict station-level imbalance ratios and wait times at each time step. Results show over 90% prediction accuracy, demonstrating the potential of integrating simulation and deep learning to support bike-share system planning.

Keywords: *Bike Share Systems, Graph Neural Networks, Spatio-temporal modelling, Transportation Simulation, Urban Mobility Analytics*

Using GIS to Determine Societal ROI from Applying Equity & Social Justice Focused Policies and Programs

Presented by Greg Babinski, GIS Management Consulting Services LLC

Description: There has been growing awareness of equity and social justice (ESJ) within the professional cost-benefit analysis (CBA) community.

A principle of CBA is that public investments & policies should be analyzed on the basis of the financial benefits that they provide. Especially if there are competing investments or policy options, it is a legitimate interest of public agencies to understand which option provides the optimal financial benefit.

GIS has been validated as an essential tool for doing effective ESJ policy and program development. GIS has also been validated as providing significant financial ROI to the Agencies that use it.

This session outlines a proposed methodology that will combine the use of GIS with societal and government benefits ROI analysis. It will demonstrate that CBA, aided by GIS, can be used to demonstrate that ESJ programs and policies, in addition to being the right thing to do, also deliver significant return on investment.

Keywords: *GIS for ESJ, CBA, ROI, Cost-Benefit Analysis, Return on Investment, GIS ROI*

Improving Transportation for Non-Drivers of Wisconsin

Presented by David Buehler and Nyla Thursday WisDOT

Description: Transportation is an essential need that affects every aspect of our lives, but non-drivers often face challenges getting where they need to go. The Wisconsin Department of Transportation (WisDOT) is committed to improving mobility, safety, and access for non-drivers in Wisconsin, which is why it developed the Non-Driver Interactive Mapping tool. This tool reveals that non-drivers comprise a significant percentage of Wisconsin's population and are present in all areas of our state. This session will explore the data, mapping tool, available resources, and how end users put information to work to improve transportation access.

Keywords: *Transportation, Driving, Web Tools, FME, ArcGIS Online, Statistical, Analysis, Transportation Planning, Spatial Analysis*