Working with ArcGIS Network Analyst

Two days

Overview

Built around the network dataset, ArcGIS Network Analyst software incorporates an advanced connectivity model to accurately represent real-world multimodal networks. This course teaches how to create network datasets and migrate existing data, such as shapefiles and coverages, into a network dataset in order to model and analyze transportation networks. Students work with network datasets to solve different types of network problems such as finding the most efficient travel route, finding the closest facility, and defining service areas based on travel time. The course also teaches how to calculate origin-destination matrices for network locations and assign routes and stops for a fleet of vehicles.

Note: Except for comparison purposes, the course does not cover geometric networks, which are typically used to model directed flow networks in utilities such as electric and gas, pipeline, water/wastewater, telecommunications, and location-based services.

Audience

This course is designed for experienced ArcGIS users who want to perform GIS-based routing and transportation network analysis. Those working in the transportation, logistics, public safety, local government, utilities, and business industries may find the course of particular interest.

Prerequisites and recommendations

Students should have completed ArcGIS Desktop II: Tools and Functionality or Learning ArcGIS Desktop and ArcGIS Desktop III: GIS Workflows and Analysis. Completion of Building Geodatabases is recommended.

Goals

- Understand the fundamental concepts of the ArcGIS network dataset.
- Create network datasets.
- Define network dataset properties such as network elements, connectivity groups, and network attributes.
- Migrate existing network data sources to ArcGIS network datasets.
- Generate and use turn movements within network datasets.
- Solve routing, closest facility, service area, and origin-destination, and vehicle routing problems in a transportation network.
- Perform transportation network analysis using tools and models.

Topics covered

Fundamentals of network systems: Directed flow networks; Undirected flow networks; Physical and logical network representation; Edges, junctions, and turns; Overview of working with a network dataset.

Network Analyst basics and the Route solver: Network analysis workflow; the Network Analyst toolbar and Network Analyst window; Network layers vs. network analysis layers; Network locations—stops, barriers, and routes; Network analysis layer properties—impedance, turns, restrictions, and time windows; Route solver concepts; Route solver types; Route outputs and direction reports.

Additional network solvers: Closest Facility solver, options and results; Service Area solver, options and results; Origin-Destination Cost Matrix solver, options and results.

Advanced network analysis options: Setting network locations; Network location attributes; Network location analysis properties; Time windows; Curb approach; Edge hierarchy; Exact vs. hierarchical routes.

Preparing data for network analysis: Workflow for network analysis; Allowable data sources; Data quality requirements; Feature coincidence, connectivity, and the Integrate tool; Network attributes; Migrating coverage and shapefile networks to the geodatabase.

Network dataset connectivity: Connectivity groups, policies and elevations; Connectivity with sources and subtypes; Connectivity requirements; Multiple connectivity groups; Connectivity between groups; Edge and junction connectivity policies; Elevation levels and connectivity; Modeling intersections and overpasses; Connectivity scenarios and solutions.

Network attributes: Edge, junction, and turn attributes; Network attribute properties; Network attribute types; Cost attributes; Restriction attributes; Hierarchy attributes; Descriptor attributes; Edge directionality attributes; Setting network element attributes with Evaluators. Creating parameters on attributes.

Creating and building network datasets: Workflow for building a network; Selecting sources; Setting connectivity; Setting turns and turn penalties; Setting network attributes; Setting direction properties; Building network datasets for geodatabases, shapefiles, or StreetMap datasets.

Modifying network datasets: Editing network point, line, and turn features; Editing network dataset properties; Rebuilding the network dataset; Creating multimodal networks; Multimodal networks and connectivity groups; Multimodal analysis.

Network Analyst and geoprocessing: Geoprocessing framework review; Network Analyst Tools toolbox; Network Analyst tools; Network solvers in ModelBuilder.