Building a network model for DeKalb County, Georgia

Objectives

1. To build and analyze a transportation network model for DeKalb County, Georgia.
2. To evaluate key network properties such as directionality, weights, node and edge counts, and density.
3. To visualize the transportation network for insights into connectivity and spatial structure.

Methods

1. Prerequisites

- Used VS Code for its ability to handle large datasets efficiently, rather than Jupyter Notebook.
- Installed key Python libraries: OSMnx for data fetching, NetworkX for graph analysis, and Matplotlib for visualization**.**

2. Data Acquisition

- Defined DeKalb County, Georgia, USA as the location of interest.
- Fetched the road network with OSMnx using the graph_from_place function for driveable streets.

3. Network Modeling and Analysis

- Directed vs. Undirected: Used the nx.is_directed() function to confirm the network is directed.
- Weighted vs. Unweighted: Stored edge lengths as weights (data['length']) and calculated a total weighted node degree of 9,264,779 meters.
- Node and Edge Counts: The network includes 24,003 nodes and 56,460 edges.
- Network Density: Calculated density using nx.density(G), obtaining a value of 9.8×10^{-5}. Rounded the density for clarity.

4. Visualization

- Visualized the road network with OSMnx using a purple-yellow color scheme to enhance contrast, purple for nodes and yellow for Edges, with black background for improved visibility.
- Saved the visualization as an image file (dekalb_road_network.png).