 **GIS EXERCISES**

**Exercise 4: Network Analysis**

**Objective:** Determine the shortest route from each church to the nearest hospital

**Example Scenario:** In a disaster response scenario, you need to identify efficient evacuation routes from churches to nearby hospitals for residents in affected areas. By performing network analysis, you can determine the shortest routes for transporting injured individuals or providing medical assistance during emergencies.

**Steps:**

**Load Shapefiles**:

Open ArcGIS and load the following shapefiles into your map project:

Churches

Hospitals

Road network (if available)

Prepare Network Dataset (if applicable):

If you have a road network shapefile, create a network dataset using the Network Analyst extension in ArcGIS. Define appropriate network attributes such as speed limits, road classifications, and turn restrictions.

**Set Network Analysis Parameters:**

Access the Network Analyst toolbar and choose the "Closest Facility" tool.

Set the facilities layer to "Hospitals" and the incidents layer to "Churches."

Define other parameters such as the number of facilities to find (e.g., 1), travel mode, and impedance (e.g., shortest distance or quickest travel time).

**Run Network Analysis:**

Execute the network analysis to find the shortest route from each church to the nearest hospital.

**Review Results:**

Examine the generated routes on the map to visualize the paths from churches to hospitals.

Review route attributes such as distance travelled and travel time.

**Optimize Routes (Optional):**

Optionally, you can optimize routes further by adjusting network parameters or considering additional constraints (e.g., avoiding toll roads, minimizing turns).

**Interpret Results:**

Analyse the generated routes to identify patterns and potential areas of concern, such as churches located far from the nearest hospital or routes with significant travel obstacles.

**Generate Reports:**

Document your findings, including the shortest routes from each church to the nearest hospital and any observations regarding route efficiency or accessibility.

**Skills Learned:**

Application of network analysis techniques to find optimal routes between locations.

Understanding of network impedance and travel mode considerations.

Interpretation of network analysis results for urban planning, emergency response, and transportation management purposes.

***Note:*** *Discuss the importance of network analysis in various GIS applications, including transportation planning, logistics, and emergency management. Encourage students to explore advanced network analysis features such as multi-modal routing, time-based restrictions, and service area analysis for comprehensive spatial planning and analysis.*