This week, we will focus on spatial analysis and modeling. Spatial analysis includes methods used to interpret and make sense of geographic data. Spatial modeling involves the processes of predicting future situations or evaluating various scenarios using these analyses. In this course, types of spatial analysis, spatial relationship and overlay analyses, spatial statistics and spatial data modeling and decision support systems in GIS will be discussed.

1. Types of Spatial Analysis: Point Analyzes, Surface Analyzes, Network Analyzes

Spatial analyzes enable geographical data to be analyzed using different methods. The main types of spatial analysis are:

Spot Analysis

Point Density Analysis: Measures the density of point data in a specific area. For example, crime density maps.

Proximity Analysis: Measures the distance from one point to another. For example, the distance of schools to hospitals.

Surface Analysis

Slope and Aspect Analyzes: Calculates the slope and aspect values ​​of the surface. For example, determining suitable slopes for agricultural lands.

View Analysis: Determines the areas visible from a certain point. For example, line of sight analysis for communication towers.

Network Analyzes

Shortest Path Analysis: Determines the shortest path on a network. For example, the shortest route for emergency vehicles.

Service Area Analysis: Determines the areas that can be reached within a certain distance from a certain point. For example, service areas of fire stations.

2. Spatial Relationship and Overlay Analyzes

Spatial relationship and overlay analyzes identify how different data layers are related to each other and analyze these relationships.

Spatial Relationship Analyzes

Distance and Neighborhood Analyzes: The distance or neighborhood relations of an object to another object are examined.

Containment Analyzes: It is analyzed whether an object is inside another object. For example, whether parks are within city limits.

Overlay Analyzes

Intersect Analysis: Identifies overlapping areas of two or more data layers. For example, agricultural land at risk of flooding.

Union Analysis: Determines the union areas of two or more data layers. For example, natural protected areas and tourism areas.

3. Spatial Statistics and Spatial Data Modeling

Spatial statistics uses statistical methods to analyze spatial data. Spatial data modeling creates various scenarios and predictions using these analyses.

Spatial Statistics

Cluster Analysis: Determines whether spatial data is concentrated in certain areas.

Moran's I and Getis-Ord Gi Statistics\*: Used to determine spatial autocorrelation and hot spots.

Spatial Data Modeling

Regression Models: Analyzes how spatial data changes according to independent variables.

Simulation Models: Simulates future situations or scenarios. For example, urban growth patterns.

4. Decision Support Systems in GIS

Decision support systems (DSS) in GIS are systems used to analyze geographic data and support decision-making processes.

Components of Decision Support Systems

Data Management: Collecting, storing and managing geographic data.

Modeling and Analysis: Analyzing geographical data and creating models.

User Interface: The interface that allows decision makers to interact with the system.

Areas of Use of Decision Support Systems

Urban Planning: Making and managing development plans of cities.

Natural Disaster Management: Identifying and managing disaster risks.

Environmental Management: Protection and management of natural resources.