Introduction to Discrete Spatial Variables

In this unit you will learn characteristics and different behaviour of continuous and discontinuous spatial distribution of spatial phenomena. Spatial variables are used to describe and analyze the spatial distribution of phenomenon. We will focus on discrete spatial variables that describe the discrete spatial distribution of phenomenon. Then you will learn a priori features and posterior features, which can be defined, based on the spatial variables and regionalisation.

Moreover, representation of real world spatial features in object mode and image mode will be presented.

We will introduce orientation of units that you will learn after this unit based on the knowledge you gained after this unit.

Moreover, the linkage to the other lessons and modules are presented for your reference.

Introduction to Geographic Objects

G of GIS can be interpreted as Geographic Object or Spatial Object or Spatial features or Geographic Individuals. At the planet scale, out world is only one object with the defined boundary. At the global scale, you can view our planet as water and landmass. They have their owned defined boundary. In our planet, there is more water mass than landmass. It is interesting why our planet is called as Earth other than Water. Anyway, at the more refined scale, electric poles, river, road, tramlines, water pipes, fire hydrants, lake, vineyards, agriculture lands and the forest patch are examples of geographic objects. Most of the tangible geographic objects have the defined acceptable boundary and properties such as name, types and status etc. These are called discrete geographic objects. These are also called discrete objects. For example, lake Geneva has a defined boundary. Its name (property) is called Geneva Lake. After that boundary, it is not called as Geneva Lake (property). It is one of the most famous (status) urban lakes in the world. Therefore Geneva Lake is discrete geographic object.

The geographic boundaries are defined non-thematically or thematically.

The national boundaries are defined as the nationality as the theme.

Land use and land cover boundaries are defined thematically.

These geographic objects have the phenomena too. These phenomena are difficult to delineate the boundary. Most phenomenons are intangible or perceptible by sense such as temperature. Some phenomenons are tangible such as distribution of vegetation at ecotone. Ecotone is the fuzzy boundary between two ecological communities. Temperature, rainfall, elevations and ecotones are good example of phenomenon. At the global scale, we cannot draw the temperature boundary of our earth. At the more refined scale, we cannot still draw the temperature boundary of Zurich Lake. Because the boundary of

phenomenon does not truly exist. It exists arbitrary as the fuzzy boundaries. The phenomena are continuous natures. Therefore these phenomena are illustrated with arbitrary defined boundary, which are normally fuzzy. We will learn how to draw the fuzzy boundaries for phenomenons.

These phenomena are illustrated as continuous surfaces using grid cells. Each grid cell has a real value of phenomenon (e.g. continuous temperature) based on field measurements and interpolated values.

More detail on sampling and interpolation to generate the continuous phenomenon of geographic objects will be discussed in a dedicated lesson. Moreover, we will learn how to represent continuous phenomenon surfaces into arbitrarily defined fuzzy boundary as discrete objects in the future units.

Spatial Features

The spatial objects can be represented in object (vector) mode or image (raster) mode. In object mode, individual spatial objects can be defined as point or line or polygon. In image mode, individual spatial object can be defined as a set of contiguous grid cells, which is called as region.

Although a spatial object and phenomenon can be defined in object mode and image mode, discrete spatial objects can be more accurately present in object mode and continuous phenomena of spatial objects are more meaningfully presented in image mode.

Develop a simple model

1. Develop simple data model for urban road transportation information system.
2. Develop simple data model for Soil pH distribution.