

Geostatistics Fall_2021

Homework 3

1. Use the typhoon rainfall data in Homework 1 for the following analyses:

(1) Calculate the scaled hourly rainfall data by the following treatment:

$$Z_s(i, j) = Z(i, j)/s(j)$$

$$s(j) = \sqrt{\frac{1}{(n-1)} \sum_{i=1}^n (Z(i, j) - \bar{Z}_n(j))^2}, j = 1, 2, \dots, 24; i = 1, 2, \dots, n = 30$$

$$\bar{Z}_n(j) = \frac{1}{n} \sum_{i=1}^n Z(i, j), j = 1, 2, \dots, 24.$$

where $Z(i, j)$ is the hourly rainfall of the j -th hour at the i -th station.

(2) Calculate the sample semi-variogram of the scaled hourly rainfall data by combining data of all hours.

(3) Fit the above sample semi-variogram by an exponential semi-variogram model.

(4) Using the exponential semi-variogram model derived in (3), conduct the ordinary kriging estimation for typhoon rainfalls of individual hours in norther Taiwan. You need to show the maps or images of kriging estimates and the kriging variance.

Note: A GIS shapefile (Danshui_river.zip) of the study area is provided.