

Comparison of Inverse Distance Weighting and Ordinary Kriging Methods for Meteorological Maps

Mustafa Hüsrevoğlu^{1*}, İsmail Bülent Gündoğdu²

¹RA., Engineering Faculty, Geomatics Engineering, Nigde Omer Halisdemir University, Nigde-TURKEY

²Prof. Dr., Engineering Faculty, Geomatics Engineering, Selcuk University, Konya-TURKEY

*Corresponding author: mustafahusrev@gmail.com

+Speaker: mustafahusrev@gmail.com

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Abstract- Generally, it is limited to obtain all kinds of data for determining of variables which distributed points in any area. Estimates are made from this data for unsampled locations. Thus, the spatial properties of an examined variable are defined all over the area. Several spatial interpolation methods have been used for this purpose. Results of different traditional interpolation methods are not same and adequate. Precipitation events are very important for environmental research, and main subject of this study.

In this study, the mean monthly precipitations data obtained from 265 meteorological observation stations for longterm period in Turkey. These data have been used to construct country wide prediction maps. Dataset of precipitation events is provided from Turkish Meteorological Service. Conventional statistical methods such as Inverse Distance Weighting (IDW) are used frequently in climate studies but knowledge about the uncertainty of the estimation findings obtained by these methods cannot be evaluate. The IDW method is a deterministic and global or locally applicable spatial interpolation method. The method is based on the inverse relation between the distance and the similarity. On the other hands, the accuracy and biases of estimation results can be evaluated by geostatistical analysis. Geostatistical analysis is applied with kriging methods, and Ordinary Kriging (OK) method is most widely used. In this study, spatial distributions of precipitations over the Turkey have been evaulated by IDW and OK methods. The errors of the estimates are determined by cross-validation method. Then, these methods compared each other. The IDW method can be easily applied, however the principles of geostatistics need to be known for prediction by kriging methods. Before the kriging estimation, precipitation data have been examined for suitability of geostatistical assumptions for application. According to cross-validation findings of prediction results, mean prediction error of IDW and OK methods are respectively 0,049 cm and 0,005 cm. In addition, the root mean square error (RMSE) of the IDW method is 1,398, and the RMSE error of the OK method has been calculated as 1,349.

As a result the superiority of OK method than other interpolation technique has been proved by the dataset and illustrated results with maps on the area. These maps will help to take a precaution for torrent or arid condition in future.

Keywords- Ordinary kriging, Inverse distance weighting, Precipitation maps, Interpolation techniques.