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A RADIAL BASIS FUNCTION APPROACH TO ESTIMATE PRECIPITATION IN BRASOV COUNTY, ROMANIA

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Abstract

This research tackles the problems of spatial distribution of precipitation using five deterministic sub methods related to the radial basis function (RBF) group: thin-plate spline (TPS), spline with tension (ST), multiquadric (MQ), inverse multiquadric (IMQ) and completely regularized spline (CRS). The study is used for retrieving annual precipitation over Brasov County, Romania for a period of two decades (2000-2019) using data from the fifth-generation reanalysis dataset (ERA5) provided by the European Centre for Medium-range Weather Forecasts (ECMWF). Each method was tested for 10 and 60 neighbours, and the results were evaluated through cross-validation, Taylor diagram and six statistical indicators: root mean square error (RMSE), mean error (ME), correlation coefficient (R), determination coefficient (R^2), average absolute percent relative error (AAPRE) and average percent relative error (APRE). The result of the study shows a similar pattern between all methods, where the predicted precipitation increases from south to north. The southern part of Brasov County recorded in two decades 1547.7 mm precipitation, and the northern part 2149.5 mm. From all the methods analysed, the most accurate method of predicting precipitation in Brasov County is ST60. The study reveals that the number of neighbours influence the accuracy of prediction. As a result, the best prediction of precipitation was generated by ST60. Not for all methods the increase number of neighbours led to better results. From all outputs, 66.6% have better results when is used 60 neighbours and 34.4% with 10 neighbours.

Keywords: cross-validation, deterministic, precipitation, prediction

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