



A protocol based on confidence levels for the ranking of interpolation algorithms

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3 1 **A protocol based on confidence levels for the ranking of interpolation**
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1 A protocol based on confidence levels for the ranking of interpolation 2 algorithms

3 The choice of the best interpolation algorithm of data gathered at a finite number
4 of locations has been a persistently relevant topic. Typical papers take a single
5 dataset, a single set of data points, and a handful of algorithms. The process
6 considers a subset I of the data points as known, builds the interpolant with each
7 algorithm, applies it to the points of another subset C, and evaluates the MAE
8 (Mean Absolute Error), the RMSE (Root Mean Square Error) or any other metric
9 over such points. The less these statistics are, the better the algorithm is, so a
10 deterministic ranking between methods (without confidence level) can be derived
11 based upon it. Ties between methods are usually not considered. In this paper a
12 complete protocol is proposed in order to build, with a modest additional effort, a
13 ranking with a confidence level. To illustrate this point, the results of two tests
14 are shown. In the first one, a simple Monte Carlo experiment was devised using
15 irregularly distributed points taken from a reference DEM (Digital Elevation
16 Model) in raster format. Different metrics led to different rankings, suggesting
17 that the choice of the metric to define the “best interpolation algorithm” would
18 need a trade off. The second experiment used mean daily radiation data from an
19 international interpolation comparison exercise and RMSE as the metric of
20 success. Only five simple interpolation methods were employed. The ranking
21 using this protocol anticipated correctly the first and second place, afterwards
22 confirmed employing independent control data.

23 Keywords: Interpolation, ranking, confidence level

24 Subject classification codes:

25 1. Introduction

26 Any interpolant is an empirical function of position, estimated with data taken from
27 scattered locations, which honours these data values. They are widely used in almost
28 any field (geosciences, mathematics, physics, etc.) with predictive and visualization
29 purposes.