MAMERN VII–2017: 7^{th} International Conference on Approximation Methods
and Numerical Modelling in Environment and Natural Resources
Oujda (Morocco), May 17-20, 2017

Radial basis function interpolation on spheres with application to electroencephalographic data

Janin Jäger

Justus-Liebig University, Giessen, Germany.
Janin.Jaeger@math.uni-giessen.de

Keywords: Interpolation, radial functions, spherical basis functions, neurological application.

Abstract. *Interpolation using radial basis functions has been widely used during the last 20 years. Especially when the data are stemming from sphere-like surfaces good results have been achieved. In the present contribution we describe the key elements of spherical basis function interpolation, the differences to interpolation in the Euclidean space and the application to problems occurring in neurophysiology. Radial basis function interpolation uses real valued basis functions whose value depends solely on its distance to the origin. Usually the Euclidean distance is used but for data lying on a sphere there is an adaptation using the geodetic distance, in this case the basis functions are called zonal or spherical. We will describe some of the applicable basis functions and state results on solvability and approximation order before showing the results achieved in the neurological application.*

The reconstruction of data by interpolation methods is of practical interest in EEG research as it is a basis for brain-mapping of multichannel data. We applied the radial basis function interpolation to various sets EEG data, and evaluated the accuracy of the reconstructed signal using different basis functions. We will show that the interpolation with multiquadric radial basis functions gives very good results, for reconstructing the data of one or two electrodes and is also applicable as an method to derive 64-channel EEG data from only 32-channel recording.