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Radial Basis Functions: Meshless Interpolation and Approximation Methods

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Abstract

Interpolation and approximation methods are widely used in data processing. The majority of methods require the data domain tessellation, e.g. using Delaunay triangulation, which leads to severe computational complication for higher dimensions. There are also severe problems with smoothness of the final interpolation or approximation in general.

On the other hand, the meshless (meshfree) methods are simple as they leads to a solution of linear systems of equations. Also, smoothness is their natural property. Even more, the meshless based method based on radial basis functions (RBFs) are nearly independent on the problem dimensionality.

In this talk, the basic principles of the RBF interpolation and approximation methods will be introduced with relevant mathematical formulations. Several examples of use will be given, especially some selected experimental results with large and high dimensional datasets will be presented.