

Hats Improve the Image

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Abstract: Data fitting in high dimensions is an integral part of a number of applications including 3D reconstruction of geometric models, finger print matching, data mining, image warping, medical image analysis, and optic flow computations.

A commonly used technique to fit the data is the thin plate spline method.

Traditional thin plate splines use radial basis functions and require the solution of a dense linear system of equations whose size is proportional to the number of data points. Instead of the radial basis functions we present a method based on the use of polynomials with local support defined on finite element grids (hat functions). This method is more efficient when dealing with large data sets as the system of equations is sparse and its size depends only on the number of nodes in the finite element grid.

Theory is developed for general d -dimensional data sets and model problems are presented in 2D and 3D to study the convergence behaviour.

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