Linking RBF Interpolation and PDE-based Inpainting

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Let us assume that of an image f, we are given a subsample, for example a random sample of 10% of the image pixels, from which we want to reconstruct the whole image f. This task can be considered from different points of view:

- On the one hand, for researchers with an image analysis or computer vision background, this is an inpainting problem. Among the many strategies for inpainting, PDE-based methods are quite successful and produce very convincing results.

- On the other hand, for researchers from an approximation theoretic background, this looks like a scattered data problem. Such problems might be solved by an interpolation approach using radial basis functions.

Many popular radial basis functions can be linked to partial differential equations; for example the thin plate spline which is related to the biharmonic operator or the Gaussian which can be related to diffusion processes. This observation leads to the question whether there is a deeper connection between the two above mentioned inpainting approaches.

This talk explores the aforementioned connection and discusses how it can be used for image compression. Our main tools are pseudo-differential operators and corresponding Green's functions.

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