Numerical Methods for Coupled Super-Resolution

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Abstract

The process of combining, via mathematical software tools, a set of low resolution images into a single high resolution image is often referred to as super-resolution. Algorithms for super-resolution involve two key steps: registration and reconstruction. Most approaches decouple these steps, solving each independently. This can be effective if there are very simple, linear displacements between the low resolution images. However, for more complex, nonlinear, nonuniform transformations, estimating the displacements can be very difficult, leading to severe inaccuracies in the reconstructed high resolution image. In this talk we present a mathematical framework and optimization algorithms that can be used to jointly estimate these quantities. Efficient implementation details are considered, and numerical experiments are provided to illustrate the effectiveness of our approach.

This is joint work with Julianne Chung and Eldad Haber.