

Image Compression by Partial Differential Equations

We introduce and discuss shape-based models for finding the best interpolation data in the compression of images. The aim is to reconstruct missing regions by means of minimizing an error term between the images and their reconstructed counterparts using PDE inpainting. We analyze the proposed models in the framework of shape optimization from two different points of view. First, we consider a continuous PDE model and get pointwise information on the "relevance" of each pixel by a topological asymptotic method. Second, we introduce a finite dimensional setting of the continuous model based on "fat pixels" (balls with positive radius), and we study asymptotics when the radius vanishes. Numerical computations are presented that confirm the usefulness of our theoretical findings for PDE-based image compression.