Image Reconstruction and Segmentation Using Mesh Adaptation

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ABSTRACT

In large-scale image processing applications, the aim is to reconstruct and segment an image from measured data [1, 2]. The reconstruction problem is ill-posed, and requires regularization in order to compute a meaningful approximation of the solution. Segmentation is often then done as a post-processing tool, after the inverse problem is solved. This two-step process (reconstruct then segment) can then be iterated to produce higher resolution reconstructions, and more accurate segmentations.

In this talk we focus on image reconstruction and segmentation starting from indirect measurements. A classical example in such a direction is represented by tomographic imaging when the reconstruction-segmentation process works directly on x-ray projection data [3]. In particular, we aim at improving the performances of some of the approaches currently available in the literature by means of a mesh adaptation procedure. The benefits due to the employment of adapted meshes have been already investigated, for instance, when image segmentation is driven by the minimization of suitable energy functionals and starting from direct measurements [4]. In this case, mesh adaptation leads to better computational performances without giving up the accuracy, with a considerable saving in terms of memory storage.

The long-term goal of this investigation is to identify computationally efficient procedures to deal with the reconstruction and segmentation of images of different types, starting from both direct and indirect measurements.

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