Convex Relaxation Methods for Computer Vision

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Numerous problems in computer vision and image analysis can be solved by variational methods and partial differential equations. Yet, many traditional approaches correspond to non-convex energies giving rise to suboptimal solutions and often strong dependency on appropriate initialization. In my presentation, I will show how problems like image segmentation, multiple view reconstruction and optical flow estimation can be formulated as variational problems. Subsequently, I will introduce methods of convexification which allow to efficiently compute globally optimal or near-optimal solutions. To solve the arising convex problems, I will introduce a provably convergent primal-dual algorithm which is easily parallelized on GPUs to allow high-quality solutions in acceptable runtimes.