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Princeton, NJ 08540. *Combinatorial Optimization for PDE based Approaches to Computer Vision.*

Variational formulation methods have been widely used in the computer vision literature. They are used to solve a wide variety of problems such as image segmentation, denoising or registration. They generally establish an energy minimization framework where the minimum solution represents the object boundary in segmentation application, a denoised representation of the image or the desired correspondence between two images in registration applications. Most of these energies are formulated in continuous domain and associated with continuous gradient optimization. Such continuous formulations can be very slow to optimize and the optimization generally yield local solutions. An alternative strategy is to formulate these energies directly in the discrete domain and minimize the discrete energy functions using combinatorial optimization methods. This talk will present the discrete formulation of some of the important models in the computer vision literature such as the Mumford-Shah model and the Euler elastica regularization. It will also discuss the advantages of such discrete solutions and the optimization challenges associated with them. (Received September 17, 2013)