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Andrea Louise Bertozzi* (bertozzi@math.ucla.edu), 520 Portola Plaza, Department of Mathematics, UCLA, Los Angeles, CA 90095. *Graphical Models in Machine Learning, Networks, and Uncertainty Quantification.*

I will speak on semi-supervised and unsupervised graph models for classification using similarity graphs and for community detection in networks. The equivalence between the graph min-cut problem and total variation minimization on the graph for an assignment function allows one to cast graph-cut variational problems in the language of total variation minimization, thus creating a parallel between low dimensional data science problems in Euclidean space (e.g. image segmentation) and high dimensional clustering. This talk reviews on a class of methods build around diffuse interface models, developed by the Author and collaborators. Semi-supervised learning with a small amount of training data can be carried out in this framework with diverse applications ranging from hyperspectral pixel classification to identifying activity in body worn video. It can also be extended to the context of uncertainty quantification with Gaussian noise models. The problem of community detection in networks also has a graph-cut structure and algorithms are presented for the use of threshold dynamics for modularity optimization. With efficient methods, this allows for the use of network modularity for unsupervised machine learning problems with unknown number of classes. (Received September 13, 2019)