May 10, 2:00 p.m.
Seminar on Image Analysis Finite Dimensional Approximation of Total Variation Regularization on Hexagonal Pixels
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Abstract: The continuous approach to image reconstruction is based on representing images as functions on a two-dimensional image domain. The frequent employment of bounded variation (BV) functions in this respect has been proven successful, although their finite dimensional approximation still raises both theoretical and numerical challenges. Common approaches for finite dimensional approximation use piecewise constant or piecewise linear functions on rectangular pixels.A discretization alternative employs hexagonal grids instead of square grids. The idea of approximating BV functions by piecewise linear splines on hexagonal pixels has already been considered in a number of image processing papers with remarkable implementation results. However, functions of bounded variation cannot be accurately approximated by piecewise constant functions on hexagonal grids for any total variation seminorm. In this paper, we show that every function of bounded variation on a bounded planar domain can be approximated by a sequence of piecewise linear splines defined on hexagonal pixels, in the sense of the strict metric convergence in the BV space. Based on this result we develop a convergence analysis for finite dimensional approximations of hexagonal total variation regularization.