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*Locally Adaptive Kernel Regression: A Non-parametric Framework for Multidimensional Signal
Processing and Analysis.*

I will present a non-parametric framework based on the notion of Kernel Regression which we generalize to adapt to local characteristics of the given data, resulting in descriptors which take into account both the spatial density of the data samples ("the geometry"), and the actual values of those samples ("the radiometry"). These descriptors are exceedingly robust in capturing the underlying structure of multidimensional signals even in the presence of significant noise, missing data, and other disturbances. As the framework does not rely upon strong assumptions about noise or signal models, it is applicable to a wide variety of problems. Of particular interest in two and three dimensions are state of the art denoising and upscaling of images and video. Of recent relevance to computer vision, I will describe the novel application of the framework to object and action detection/recognition in images, and in video, respectively, from a single example. (Received September 22, 2009)