

Digital image restoration: blur as a motion cue

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Abstract: We rely on images with ever growing emphasis. Our perception of the world is however limited by imperfect measuring conditions and devices used to acquire images. By image restoration, we understand mathematical procedures removing degradation from images. Two prominent topics of image restoration that has evolved considerably in the last 10 years are blind deconvolution and superresolution. Deconvolution by itself is an ill-posed inverse problem and one of the fundamental topics of image processing. The blind case, when the blur kernel is also unknown, is even more challenging and requires special optimization approaches to converge to the correct solution. Superresolution extends blind deconvolution by recovering lost spatial resolution of images.

In this talk we will cover the recent advances in both topics that pave the way from theory to practice. Various real acquisition scenarios will be discussed together with proposed solutions for both blind deconvolution and superresolution and efficient numerical optimization methods, which allow fast implementation. Finally we will illustrate that combining deblurring with tracking leads to interesting applications in videos.



Filip Šroubek is currently with the Institute of Information Theory and Automation, the Czech Academy of Sciences, and lectures at Charles University. From 2004 to 2006, he was on a postdoctoral position in the Instituto de Optica, CSIC, Madrid, Spain. In 2010 and 2011, he was the Fulbright Visiting Scholar at the University of California, Santa Cruz. His research covers all aspects of image processing, in particular, image restoration (denoising, blind deconvolution, super-resolution) and image fusion (multimodal, multifocus). He is an author of 8 book chapters and over 60 journal and conference papers.