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Patch based digital image processing – Principles and selected application

Abstract: We are witnessing rapid emergence of patch based, non-local digital image processing techniques. During the last decade, these techniques led to tremendous improvements in denoising, deblurring, inpainting, superresolution and many other image processing tasks. By modeling and manipulating patches of image pixels and by considering and grouping similar contexts non-locally, throughout the image, these approaches improve strongly over the more traditional pixel-based and local techniques. In this talk, we review some of the basic principles of patch-based image processing, from modeling and grouping of self-similar patches to learning dictionaries of patch-based image atoms. Selected applications in image restoration, super-resolution and inpainting will be discussed.

Biography: Aleksandra Pižurica is a professor in statistical image modelling at Ghent University. She received the Diploma Degree in Electrical Engineering from the University of Novi Sad, Serbia (1994), the M.Sc. degree in Telecommunications from the University of Belgrade, Serbia (1997) and the Ph.D. degree in Engineering from Ghent University, Belgium (2002). She was a postdoctoral fellow with the Fund for Scientific Research in Flanders – FWO (2005-2011) and was elected as a principal investigator at the research Department Multimedia Technology of iMinds (since 2009). In 2011, she has founded Statistical Image Modelling Lab at Ghent University. Aleksandra Pižurica has authored and co-authored more than 200 publications in international journals, conferences and book chapters. She has published mostly on multiresolution statistical image modelling with applications to image and video restoration, especially in the area of wavelet domain noise reduction. She currently serves as an Associate Editor for IEEE Transactions on Image Processing. Her current research interests include sparse representations of multidimensional signals, visual pattern encoding and hierarchical statistical models of visual perception.