Keynote Talks

Boris Polyak

Institute for Control Science, Moscow

Robust Principal Component Analysis

The main trend of modern data analysis is to reduce huge data bases to their low-dimensional approximations. Classical tool for this purpose is Principal Component Analysis (PCA). However it is sensitive to outliers and other deviations from standard assumptions. There are numerous approaches to robust PCA. We propose two novel models. One is based on minimization of Huber-like distances from low-dimensional subspaces. Simple method for this nonconvex matrix optimization problem is proposed. The second is robust version of maximum likelihood method for covariance and location estimation for contaminated multivariate Gaussian distribution; again we arrive to nonconvex vector-matrix optimization. Both methods are based on Reweighted Least Squares Approximations. They demonstrated fast convergence in simulations, however statistical validation as well as convergence behavior of both approaches remain open problems.

Victor Lempitsky

Skolkovo Institute of Science and Technology, Moscow

Image Synthesis with Deep Neural Networks

Using deep convolutional networks for pattern recognition in images has by now become a mature and well-known technology. More recently, there is a growing interest to using convolutional networks in a "reverse" mode, i.e. to synthesize images with certain properties rather than to recognize image content. In the talk, I will present several algorithmic results and application examples obtained for this very promising direction of research.