Convergence of MOD and ODL for dictionary learning

Karin Schnass
Universität Innsbruck, Austria
karin.schnass@uibk.ac.at

In this talk we will present sufficient conditions for the convergence of two of the most popular dictionary learning algorithms - Method of Optimal Directions (MOD) and Approximate K Singular Value Decomposition (aKSVD). Assuming that the signals following an S-sparse model based on a well-behaved generating dictionary, where each dictionary element may be used with different probability, we show the following: Given enough training signals and starting with a well-behaved initialisation, that is either within distance at most $1/\log(K)$ to the generating dictionary or has a special structure ensuring that each element of the initialisation dictionary corresponds to exactly one element of the generating dictionary, both algorithms converge with geometric convergence rate to the generating dictionary.

Joint work with Simon Ruetz (Universität Innsbruck).