Approximation of ridge functions

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Functions depending on a large number of variables play nowadays a crucial role in many areas, including parametric and stochastic PDE's, bioinformatics, financial mathematics, data analysis and learning theory. Unfortunately, multivariate problems suffer often from the so called *curse of dimension*, that is the minimal number of operations needed to achieve a reasonable approximation of a function grows exponentially with the underlying dimension of the problem. Thus to approximate multivariate functions we have to make use of some structures known a priori.

In this talk we focus on the approximation of ridge functions, which do not depend on all variables of the underlying space but only on a few linear parameters, i.e. we study the approximation of multivariate functions taking the form $f(x) = g(\langle a, x\rangle)$ for some univariate function g and a fixed (sparse) vector a. We will evolve approximation schemes for those functions using tools from compressed sensing and show numerical results.

Results presented in this talk are joint work with Jan Vybíral.