A multidimensional descent method in optimization Alexander Rubinov

Abstract:

Numerical methods for global optimization are very time consuming and could not be applied for high-dimensional non-convex optimization problems. This is the reason why many researches use various combinations of global and local techniques. The following two types of combinations are popular:

- 1) A local technique is used in order to obtain a stationary point. Then a global technique should be applied in order to escape from this point and find an initial guess for the new round of a local search.
- 2) Points obtained by a global technique are used as initial points for a local search.

Some methods for global optimization are fast enough in small dimensions. This observation gives rise to a completely new combination of local and global techniques that is discussed in the lecture. Namely, we suggest to apply a global technique for the search for the descent in dimensions higher than one, using a local approximation of the function at the point at hand. We use the cutting angle method for the global search and the discrete gradient technique for a local approximation. Numerical experiments confirm that the suggested approach is beneficial for minimization of nonsmooth functions with many shallow local minima. Using this technique we succeed to find new best known values for some well-known clustering problems.