Matroid width parameters and integer programming

Abstract

We start with presenting an overview of width parameters for graphs and their counterparts for matroids. We will particularly focus on the parameter called branch-depth, which is the counterpart of tree-depth of a graph. Our interest in this parameter comes from the integer programming: there exists a strongly fixed parameter algorithm for integer programs with the constraint matrix with bounded dual tree-depth and bounded entries. However, the dual tree-depth of the matrix is not preserved by row operations. We will show that the branch-depth of the matroid formed by the columns of the constraint matrix is equal to the minimal tree-depth of a row-equivalent matrix, and discuss algorithmic corollaries of this result.

The talk will be self-contained. The results presented in this talk are based on joint work with Timothy Chan, Jacob Cooper, Martin Koutecky and Kristyna Pekarkova.