Efficient and effective optimization methods for sparse generalized inverses

Jon Lee*[1]

[1]University of Michigan – États-Unis

Résumé

The Moore-Penrose (M-P) pseudo-inverse has a prominent place in matrix theory and applications. It is well-known that the M-P pseudo-inverse is characterized by the four M-P properties. But not all of these properties are needed for the use of it in applications like least-squares fitting. In particular, when a matrix is not full rank, as is common in modern applications, there are much sparser (and even block structured, for explainabilty) generalized inverses than the M-P pseudo-inverse that solve the least-squares problem for arbitrary response vectors. Besides sparsity and structured sparsity, we are interested in low-rank and low-norm solutions, for further explainability and numerical stability. So, we attack the problem of generating such generalized inverses using optimization methods. Our techniques include: linear programming (LP), second-order cone programming (SOCP), local-search based approximation methods, the alternating direction method of multipliers (ADMM), and accelerations of these ideas via new structural results on generalized inverses. This is joint work with Marcia Fampa, Gabriel Ponte, Luze Xu.

*Intervenant