Conic, especially copositive optimization

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Timetable: 8 hrs. At https://elearning.unipd.it/math/course/index.php?categoryid=47 enrolled people can find useful information to follow the classes.

Calendar of the lectures
Tuesday October 27, 2020, 16:00
Wednesday October 28, 2020, 10:00-12:00
Thursday October 29, 2020, 10:00-12:00 and 15:00-17:00

Course requirements:

Examination and grading:

SSD: MAT/09

Aim:

Course contents: Quite many combinatorial and some important non-convex continuous optimization problems admit a conic representation, where the complexity of solving non-convex programs is shifted towards the complexity of sheer feasibility (i.e., membership of the cone which is assumed to be a proper convex one), while structural constraints and the objective are all linear. The resulting problem is therefore a convex one, and still equivalent to some NP-hard problems with inefficient local solutions despite the fact that in the conic formulation, all local solutions are global.

Using characterizations of copositivity, one arrives at various approximations. However, not all of these are tractable with current technology. In this course, we will address some approaches on which tractable SDP- or LP-approximations, and also branch-and-bound schemes, may be based.

This way, good tractable bounds can be achieved which serve as quality control for any primal-feasible algorithm. But which one should be employed? Complementing above (dual) approach, we will, mainly as one example, address a classical yet not widely known first-order approach for poly/posynomial optimization under simplex constraints, embedded in some general optimization principles for iterative primal methods.