Research Highlight: The supporting halfspace quadratic programming strategy for the dual of the best approximation problem

Work of Dr Jeffrey Pang

Algorithms for projecting a point onto the intersection of convex sets are useful subroutines for solving optimization problems with constraints. One such algorithm is the Dykstra's algorithm, which is known to be alternating minimization on the dual problem. The projection onto each convex set generates a halfspace supporting the set. It is also relatively easy to project onto the intersection of such halfspaces using quadratic programming. The main contribution of this paper is to show how to make use of such halfspaces and quadratic programming to decrease the objective value of the dual problem in a greedy manner, while maintaining convergence. Other connections to current topics in first order methods are also discussed.

Reference:

[1] C.H.J. Pang, “The supporting halfspace quadratic programming strategy for the dual of the best approximation problem”. Siam Journal on Optimization, 26, No. 4 (2016): 2591-2619.