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Data-driven Integration of Norm Penalized Mean-variance Optimization

Mean-variance optimization (MVO) is known to be sensitive to estimation error in its inputs. Norm penalization of MVO programs is a regularization technique that can mitigate the adverse effects of estimation error. We augment the standard MVO program with a convex combination of parameterized L1 and L2 norm penalty functions. The resulting program is a parameterized quadratic program (QP) whose dual is a box-constrained QP. We make use of recent advances in neural network architecture for differentiable QPs and present a data-driven framework for optimizing parameterized norm-penalties to minimize the downstream MVO objective. Historical simulations using US stocks and global futures data demonstrate the benefit of the integrated data-driven approach.