

# Some problems in theoretical and applied optimization

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In this plenary talk, I am going to speak about three problems. The first one is about inverse optimization and its application in portfolio selection. Inverse optimization and its applications as well as the Black-Litterman (BL) model, as a widely used asset allocation model in the financial industry, are briefly reviewed. It is shown that the statistical framework of BL model can be replaced by an inverse optimization idea. Main results presented in this part of the talk have been developed by Bertsimas (MIT), Gupta (MIT), and Paschalidis (Boston University); see [1].

The second problem is about a multiobjective programming modelling in energy economics. A new multiobjective joint energy and reserve market clearing model is presented, in which the payment cost minimization and the voltage stability maximization are considered as the economic and security objectives, respectively. Due to some practical purposes, we are looking for efficient solutions in which the ratio between two objectives belongs to a pre-specified range. An approach, called BDSG (bi-objective desired solution generator), is proposed to obtain a desired solution. It is shown that the desired solution is determined without approximating all efficient solutions, which in turn results in lower processing time and computational burden. This part of the presentation is based a joint work with Goroochi-Sardou & Ameli (Shahid Beheshti University), Khodayar (Southern Methodist University, Dallas), and Khaledian (Amirkabir University); see [2].

Unlike the two first problems, the last one is very theoretical. This problem is about calculating derivatives of set-valued mappings. Set-valued mappings corresponding to the image space and the efficiency frontier of a parametric multiobjective optimization problem, with an unperturbed feasible set, are dealt with and their differential properties, in terms of Hadamard directional derivatives and tangent cones, are investigated. Moreover, some basic properties of generalized contingent and adjacent cones, in the presence of a nonsmooth kernel function, are given. These results have been published in a joint work with Mirzaee (Kharazmi University); see [3].

## References

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