



Séminaire du CIRRELT

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APPLICATION OF THE CARDINALITY-CONSTRAINED APPROACH TO ADDRESS PROBLEMS IN HEALTHCARE ACTIVITIES PLANNING

Abstract: Dealing with uncertainty is fundamental in healthcare optimization problems, and it cannot be neglected due to the significant impact on both the quality and the feasibility of the problem solution. Indeed, high uncertainty is always related to patient conditions and demands, and the solutions should guarantee a good quality of the service over a usually wide number of possible future realizations. Different approaches have been proposed in the literature and applied to deal with uncertainty in healthcare optimization. They can be mainly classified into: stochastic programming; distributionally robust optimization; and robust optimization. Within the robust optimization approaches, the cardinality-constrained approach, introduced by Bertsimas and Sim in 2004, represents a powerful tool that allows a trade-off between the level of robustness and the computational cost of the solution. Such an approach assumes that all uncertain parameters belong to an interval around a nominal value, and concentrates the variability of the problem by imposing that only a limited number of parameters for each constraint deviate from the nominal to the maximum value. Modeling the uncertainty in this way well fits to the healthcare field, and it can be easily understood and tuned by clinicians and planners without any background in operations research, which is another relevant advantage of this approach. However, despite its potentialities, this approach has been only marginally applied in healthcare optimization. In this seminar I discuss the concept of robustness in the healthcare optimization and I explain the cardinality-constrained approach. Then, I present some examples of its application to healthcare, e.g., to the home care nurse-to-patient assignment. Finally, I outline a possible extension of the approach, and I discuss some remarks and drawbacks to take into account while implementing the approach in the practice.

Note: Dr. Ettore Lanzarone is a permanent researcher at the division in Milan of IMATI of the National Research Council of Italy (CNR). His main research interests are: optimization of resource planning in healthcare facilities; stochastic models; scheduling algorithms; industrial bioengineering; and parameter estimation and stochastic evolution of complex dynamic systems. ettore.lanzarone@cnr.it et/and <http://www.mi.imati.cnr.it/ettore/>

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20 mai 2016 /
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