

Industrial & Systems Engineering

Seminar Announcement

Robust Optimization in Radiotherapy

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Abstract: In cancer radiotherapy, the standard formulation of the optimal fractionation problem based on the linear-quadratic dose-response model is a non-convex quadratically constrained quadratic program (QCQP). An optimal solution for this QCQP can be derived by solving a two-variable linear program. Feasibility of this solution, however, crucially depends on the so-called alpha-over-beta ratios for the organs-at-risk, whose true values are unknown. Consequently, the dosing schedule presumed optimal, in fact, may not even be feasible in practice. We address this by proposing a robust counterpart of the nominal formulation. We show that a robust solution can be derived by solving a small number of two-variable linear programs, each with a small number of constraints. We quantify the price of robustness, and compare the incidence and extent of infeasibility of the nominal and robust solutions via numerical experiments.

Bio: *Ali Ajdari* is a third year PhD. Student in the department of Industrial and Systems engineering. Prior to joining University of Washington, he received his M.Sc. and B.Sc. at Sharif University of Technology, Iran and Isfahan University of Technology, Iran; respectively.

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