From one to two-level value functions: applications and theoretical properties

Alain Zemkoho

Considering a perturbation of an optimization problem, the (optimal) value function returns the optimal objective value of the perturbed problem. Such functions are fundamental tools for studying the stability and sensitivity of optimization models, as they describe how optimal solutions and objective values respond to changes in the problem data. Despite their importance, the theoretical framework underlying value functions remains mathematically sophisticated and often quite abstract, which can make their practical role less apparent. In this talk, we take a high-level tour of several special value functions in optimization, highlighting both their theoretical properties and their practical significance. We will also see how these functions can be used to tackle important mathematical problems, with examples drawn from modern applications such as artificial intelligence and machine learning.