



Multi-Objective Optimization for Better Decisions: Methods and Applications

Banu Lokman, University of Portsmouth, UK

In today's complex landscape, organisations have to deal with optimization problems which are not single-objective in nature. Decision-makers are required to address several objectives simultaneously, such as minimizing cost, maximizing quality, enhancing sustainability, or managing risk. In many cases, there does exist a unique solution that is optimal across all objectives. Therefore, the goal is to identify Pareto-optimal or nondominated solutions where any improvement in one objective can only be achieved by sacrificing performance in another. However, as the problem size grows, the number of nondominated solutions can increase significantly, making the problem more challenging. This talk will address these challenges and explore multi-objective optimization techniques and methods which are proven to work well in producing a well-distributed set of the true nondominated points. The talk will focus on multi-objective integer and mixed-integer programs, which are widely used to model real-world decision problems across various domains, including healthcare, energy, supply chain management, and logistics. The talk will also highlight a real-world application involving the optimization of prostate biopsy sampling plans, demonstrating the practical impact of these methods.