Complexity and Approximation in Reoptimization

Abstract. In this survey the following model is considered. We assume that an instance $I$ of a computationally hard optimization problem has been solved and that we know the optimum solution of such instance. Then a new instance $I'$ is proposed, obtained by means of a slight perturbation of instance $I$. How can we exploit the knowledge we have on the solution of instance $I$ to compute a (approximate) solution of instance $I'$ in an efficient way? This computation model is called reoptimization and is of practical interest in various circumstances. In this article we first discuss what kind of performance we can expect for specific classes of problems and then we present some classical optimization problems (i.e. Max Knapsack, Min Steiner Tree, Scheduling) in which this approach has been fruitfully applied. Subsequently, we address vehicle routing problems and we show how the reoptimization approach can be used to obtain good approximate solution in an efficient way for some of these problems.