Reoptimization of TSP and Steiner Tree: 
Changing single edge-weights

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Abstract. We consider the following optimization problem: Given an instance of an optimization problem and some optimum solution for this instance, we want to find a good solution for a slightly modified instance. Additionally, the scenario is addressed where the solution for the original instance is not an arbitrary optimum solution, but is chosen among all optimum solutions in a most helpful way. In this context, we examine reoptimization of the travelling salesperson problem (MinTSP and MaxTSP as well as their metric versions) and the Steiner tree problem (MinST). We study the case where the weight of a single edge is modified. Our main results are the following: existence of a $4/3$-approximation for the metric MinTSP-problem, a $5/4$-approximation for MaxTSP, and a PTAS for the metric version of MaxTSP. Regarding the problem MinST, we give similar positive results and show nonexistence of an FPTAS.