Weighted p-median problem (Sensitivity of the optimal solution)

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The weighted p-median problem is a well-known optimization problem with numerous practical applications. In this contribution, we study the sensitivity of the weighted p-median solution to changes in conditions represented by modifications of edge lengths. In practice, this may correspond, for example, to changes in travel times on road segments in a transportation network. By sensitivity, we mean how large the changes in edge lengths must be in order to alter the optimal solution. We present a simplified one-parameter model together with its generalizations, which can be used to model the influence of external conditions on the optimal solution of the weighted p-median problem. The final part of the contribution is devoted to investigating the influence of certain graph properties (algebraic connectivity, clustering number, and others) on the increased sensitivity of the optimal solution in a given graph.