Local Search for Bicriteria Multiple Sequence Alignment

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Recently, there has been a growing interest on the multicriteria formulation of optimization problems that arise in computational biology, such as sequence alignment [T10,A13,S13]. In this work, we consider the multicriteria multiple sequence alignment, where the goal is to maximize the substitution score and minimize the number of indels or gaps. We introduce local search algorithms for several variants of this problem. The acceptance criterion of the local search is based on the dominance criterion [P07]. Several neighbourhood definitions and perturbations are presented and discussed. The local search algorithms are tested experimentally on a wide range of instances. The solution quality of this approach is compared against bounds obtained by solving a sequence of integer linear programming formulations by a known branch-and-cut approach for multiple sequence alignment [A06].

References

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