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Motif Finding Using Ant Colony Optimization

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Abstract: A challenging problem in molecular biology is the identification of the specific binding sites of transcription factors in the promoter regions of genes referred to as motifs. This paper presents an Ant Colony Optimization approach that can be used to provide the motif finding problem with promising solutions. The proposed approach incorporates a modified form of the Gibbs sampling technique as a local heuristic optimization search step. Further, it searches both in the space of starting positions as well as in the space of motif patterns so that it has more chances to discover potential motifs. The approach has been implemented and tested on some datasets including the Escherichia coli CRP protein dataset. Its performance was compared with other recent proposed algorithms for finding motifs such as MEME, MotifSampler, BioProspector, and in particular Genetic Algorithms. Experimental results show that our approach could achieve comparable or better performance in terms of motif accuracy within a reasonable computational time.