

Publications of Samuel Baguley

This document lists all peer-reviewed publications of Samuel Baguley, Chair for Algorithm Engineering, Hasso Plattner Institute, Potsdam, Germany. This listing was automatically generated on June 29, 2022. An up-to-date version is available online at hpi.de/friedrich/docs/publist/baguley.pdf.

Conference papers

- [1] Baguley, S., Friedrich, T., Timo, K., Li, X., Pappik, M., Zeif, Z., *Analysis of a Gray-Box Operator for Vertex Cover*. In: *Genetic and Evolutionary Computation Conference (GECCO)*, 2022.

Combinatorial optimization problems are a prominent application area of evolutionary algorithms, where the (1+1) EA is one of the most investigated. We extend this algorithm by introducing some problem knowledge with a specialized mutation operator which works under the assumption that the number of 1s of a solution is critical, as frequently happens in combinatorial optimization. This slight modification increases the chance to correct wrongly placed bits while preserving the simplicity and problem independence of the (1+1) EA. As an application of our algorithm we examine the vertex cover problem on certain instances, where we show that it leads to asymptotically better runtimes and even finds with higher probability optimal solutions in comparison with the usual (1+1) EA. Precisely, we compare the performance of both algorithms on paths and on complete bipartite graphs of size n . Regarding the path we prove that, for a particular initial configuration, the (1+1) EA takes in expectation $\Theta(n^4)$ iterations while the modification reduces this to $\Theta(n^3)$, and present experimental evidence that such a configuration is reached. Concerning the complete bipartite graph our modification finds the optimum in polynomial time with probability $1 - 1/2^{\Omega(n^\xi)}$ for every positive constant $\xi < 1$, which improves the known probability of $1 - 1/\text{poly}(n)$ for the (1+1) EA.