

# Space-Efficient Basic Graph Algorithms

Amr Elmasry<sup>1</sup>, Torben Hagerup<sup>2</sup>, and Frank Kammer<sup>2</sup>

- 1 Department of Computer Engineering and Systems  
Alexandria University, Alexandria 21544, Egypt  
elmasry@mpi-inf.mpg.de
- 2 Institut für Informatik, Universität Augsburg  
86135 Augsburg, Germany  
{hagerup,kammer}@informatik.uni-augsburg.de

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## Abstract

We reconsider basic algorithmic graph problems in a setting where an  $n$ -vertex input graph is read-only and the computation must take place in a working memory of  $O(n)$  bits or little more than that. For computing connected components and performing breadth-first search, we match the running times of standard algorithms that have no memory restrictions, for depth-first search and related problems we come within a factor of  $\Theta(\log \log n)$ , and for computing minimum spanning forests and single-source shortest-paths trees we come close for sparse input graphs.

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