

Cross-Paradigm Graph Algorithms

Danupon Nanongkai   

Max Planck Institute for Informatics, Saarland Informatics Campus, Saarbrücken, Germany
KTH Royal Institute of Technology, Stockholm, Sweden

Abstract

A goal of the theory of graph algorithms is algorithmic techniques that enable computing devices to process graph data with little resources (time, space, communication overhead, etc.). This led to extensive studies of graph algorithms in various models of computation (sequential algorithms, distributed algorithms, streaming algorithms, etc.) by many sub-communities. *Cross-paradigm graph algorithms* is an effort to attack the same problem in many models of computation *simultaneously*, with the goal to generate new insights that may not emerge from the isolated viewpoint of a single model and to ultimately develop techniques that can be used to solve graph problems near-optimally across many models of computation. In this talk, I will discuss some recent advances in graph algorithmic techniques for basic graph problems (e.g. minimum cut, shortest path, and maximum flow) in connection to this research program, especially some insights that led to cross-paradigm algorithms and to answering notorious open questions. No background will be assumed from the audience beyond familiarity with textbook graph algorithms.

2012 ACM Subject Classification Theory of computation → Graph algorithms analysis; Theory of computation → Models of computation

Keywords and phrases Graph Algorithms and Complexity, Efficient Algorithms, Models of Computation

Digital Object Identifier 10.4230/LIPIcs.ICALP.2024.3

Category Invited Talk

Funding *Danupon Nanongkai*: has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme under grant agreement No 715672 and was partially supported by the Swedish Research Council (Reg. No. 2019-05622).



© Danupon Nanongkai;

licensed under Creative Commons License CC-BY 4.0

51st International Colloquium on Automata, Languages, and Programming (ICALP 2024).

Editors: Karl Bringmann, Martin Grohe, Gabriele Puppis, and Ola Svensson;

Article No. 3; pp. 3:1–3:1



Leibniz International Proceedings in Informatics

Schloss Dagstuhl – Leibniz-Zentrum für Informatik, Dagstuhl Publishing, Germany

