

## Introduction

- Models and complexity measures [18], (Chapters 1-2).
- Some simple examples: broadcast and convergecast [18], (Chapter 3).

## Coloring and Maximal Independent Set (MIS).

- Deterministic 3-coloring of oriented trees in  $O(\log^* n)$  rounds [18] (Chapter 7).
- Deterministic  $(\Delta + 1)$ -coloring of graphs in  $O(\log^* n + 2^{2\Delta})$  rounds [18], (Chapter 7).
- Deterministic  $(\Delta + 1)$ -coloring of graphs in  $O(\log^* n + \Delta^2)$  rounds [15].
- Randomized  $(\Delta + 1)$ -coloring of graphs in  $O(\log n)$  rounds [9, 16]
- An  $\Omega(\log^* n)$  lower bound on 3-coloring a ring [18] (Chapter 7), [15].
- Stronger lower bounds on distributed vertex coloring [13].
- Connections between coloring and MIS [18], (Chapter 8).
- Luby's randomized algorithm for MIS [18] (Chapter 8).
- Deterministic MIS for unit ball graphs (UBGs) in doubling metric spaces in  $O(\log^* n)$  rounds. [11].
- MIS for growth-bounded graphs in  $O(\log \Delta \cdot \log^* n)$  rounds. [10].
- Distributed edge coloring [7].
- Network decomposition and connection to MIS and coloring [18] (Chapter 22), [1].

## Minimum Spanning Trees (MST).

- Distributed MST construction [5].
- Distributed MST construction in sublinear time [18] (Chapter 24), [6, 14].
- Near optimal lower bounds on MST construction [18] (Chapter 24), [19].

## Distributed Approximation Algorithms [3].

- Distributed  $O(\log n)$ -approximation of minimum dominating set (MDS) in polylogarithmic number of rounds [8].
- Extensions to weakly connected dominating sets [2].
- Distributed approximation for MDS in constant rounds [12].
- Distributed facility location [17].
- Time-approximation trade-offs for approximating an MST [4].

## References

- [1] Baruch Awerbuch, Andrew V. Goldberg, Michael Luby, and Serge A. Plotkin. Network decomposition and locality in distributed computation. In *IEEE Symposium on Foundations of Computer Science*, pages 364–369, 1989.
- [2] Devdatt Dubhashi, Alessandro Mei, Alessandro Panconesi, Jaikumar Radhakrishnan, and Arvind Srinivasan. Fast distributed algorithms for (weakly) connected dominating sets and linear-size skeletons. In *SODA '03: Proceedings of the fourteenth annual ACM-SIAM symposium on Discrete algorithms*, pages 717–724, Philadelphia, PA, USA, 2003. Society for Industrial and Applied Mathematics.

- [3] Michael Elkin. Distributed approximation: a survey. *SIGACT News*, 35(4):40–57, 2004.
- [4] Michael Elkin. Unconditional lower bounds on the time-approximation tradeoffs for the distributed minimum spanning tree problem. In *STOC '04: Proceedings of the thirty-sixth annual ACM symposium on Theory of computing*, pages 331–340, New York, NY, USA, 2004. ACM Press.
- [5] R. G. Gallager, P. A. Humblet, and P. M. Spira. A distributed algorithm for minimum-weight spanning trees. *ACM TOPLAS*, 5(1):66–77, 1983.
- [6] Juan A. Garay, Shay Kutten, and David Peleg. A sub-linear time distributed algorithm for minimum-weight spanning trees (extended abstract). In *IEEE Symposium on Foundations of Computer Science*, pages 659–668, 1993.
- [7] David A. Grable and Alessandro Panconesi. Nearly optimal distributed edge coloring in  $o(\log \log n)$  rounds. *Random Struct. Algorithms*, 10(3):385–405, 1997.
- [8] Lujun Jia, Rajmohan Rajaraman, and Torsten Suel. An efficient distributed algorithm for constructing small dominating sets. *Distrib. Comput.*, 15(4):193–205, 2002.
- [9] Ö. Johansson. Simple distributed  $(\delta+1)$ -coloring of graphs. *Information Processing Letters*, 70(5):229–232, 1999.
- [10] Fabian Kuhn, Thomas Moscibroda, Tim Nieberg, and Roger Wattenhofer. Fast Deterministic Distributed Maximal Independent Set Computation on Growth-Bounded Graphs. In *19th International Symposium on Distributed Computing (DISC), Cracow, Poland, September 2005*.
- [11] Fabian Kuhn, Thomas Moscibroda, and Roger Wattenhofer. On the locality of bounded growth. In *PODC '05: Proceedings of the twenty-fourth annual ACM symposium on Principles of distributed computing*, pages 60–68, New York, NY, USA, 2005. ACM Press.
- [12] Fabian Kuhn and Roger Wattenhofer. Constant-time distributed dominating set approximation. In *PODC '03: Proceedings of the twenty-second annual symposium on Principles of distributed computing*, pages 25–32, New York, NY, USA, 2003. ACM Press.
- [13] Fabian Kuhn and Roger Wattenhofer. On the Complexity of Distributed Graph Coloring. In *25th Annual Symposium on Principles of Distributed Computing (PODC), Denver, Colorado, USA, July 2006*.
- [14] Shay Kutten and David Peleg. Fast distributed construction of small  $k$ -dominating sets and applications. *J. Algorithms*, 28(1):40–66, 1998.
- [15] Nathan Linial. Locality in distributed graph algorithms. *SIAM J. Comput.*, 21(1):193–201, 1992.
- [16] Michael Luby. Removing randomness in parallel computation without a processor penalty. *J. Comput. Syst. Sci.*, 47(2):250–286, 1993.
- [17] Thomas Moscibroda and Roger Wattenhofer. Facility location: distributed approximation. In *PODC '05: Proceedings of the twenty-fourth annual ACM symposium on Principles of distributed computing*, pages 108–117, New York, NY, USA, 2005. ACM Press.
- [18] David Peleg. *Distributed computing: a locality-sensitive approach*. Society for Industrial and Applied Mathematics, Philadelphia, PA, USA, 2000.
- [19] David Peleg and Vitaly Rubinfeld. A near-tight lower bound on the time complexity of distributed mst construction. In *FOCS '99: Proceedings of the 40th Annual Symposium on Foundations of Computer Science*, page 253, Washington, DC, USA, 1999. IEEE Computer Society.