RESOURCES TO ACCOMPANY GRAPH ALGORITHMS: TREES, PATHS, AND CENTERS

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§1. Further Reading: Books to Study

1.1. Optimization Algorithms for Networks and Graphs, Minieka (1978).

- Chapters 2,3, 8 (Chapter 1 for a brief review of basic graph terminology)

Comments: The book is written with an industrial engineering and operations research focus, but still a decent applied text. A word of caution: some of the examples have some issues/typos, particularly in the maximum branching algorithm. The explanation of the double-sweep algorithm is also not great. The location chapter (Chapter 8) does a decent job as a quick summary. I haven't seen too many other applied books that go into all these types of centers as concisely. He also describes finding the absolute and general absolute centers.

1.2. Network Routing: Algorithms, Protocols, and Architectures, Medhi and Ramasamy (2007). *Comments:* I acknowledge some of the specific technological information is outdated. However, the book does a decent job covering the routing algorithms we discussed (Dijkstra and Bellman-Ford-Moore) in networking terms rather than mathematical ones. This would be a good book to visit now that you have a more general understanding of path problems, and see how your perspective on various routing protocols changes.

1.3. Computer Networks, Tannenbaum (1981).

- Chapter 5.2: Routing Algorithms

Comments: A classic text in networking. Notice though that the descriptions of various routing algorithms aren't clearly described the way we have learned. Try to make that connection. I like the practical notes here regarding various actual routing problems and their difficulties.

§2. Further Reading: For the Curious

2.1. A Simplification of the Double-Sweep Algorithm to Solve the k-Shortest Path Problem, Rodin and Sundarapandian, *Applied Mathematics Letters* (2000) pp. 77-85. *Comments:* This paper gives the best description of the double-sweep algorithm for the k-shortest path problem I've seen, and has an example. You really only care about Section 3 of this paper to understand the algorithm itself.

2.2. Graphs and Algorithms, Gondran and Minoux (1984).

- Chapter 1.2, 2, 3, 4

Comments: This one is much more advanced mathematically than Minieka's book. The prerequisites are not terrible, but it will be a challenge. In particular, I'd like to draw attention to something far more beautiful: the chapter on path algebras. This chapter takes the reader through some very basic modern algebra, and shows that all the path problems we discussed (and more) are ultimately variations on a single algebraic structure; we just change the operations used. It is further shown that all path algorithms are nothing more than solving some type of linear system, and discusses more general algorithms for dealing with this. It also covers multicritera problems nicely. This is for those who want to embrace a challenge to really think differently about routing.

2.3. The Absolute Centre of a Graph, Cuninghame-Green, *Discrete Applied Mathematics* (1984), Volume 7, Issue 3, pp. 275-283. This describes the problem of finding the absolute center of the graph mathematically. Advanced mathematics, but included for those interested.

2.4. Optimum Locations of Switching Centers and the Absolute Centers and Medians of a Graph, Hakimi (1964), *Operations Research* Vol. 12, Iss. 3. Hakimi's original paper on finding the absolute center and absolute median of a graph, with context to networking.

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