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MADALGO seminar by Norbert Zeh, Dalhousie University

A faster cache-oblivious shortest-path algorithm for undirected graphs with bounded edge lengths

We present a cache-oblivious algorithm for computing single-source shortest paths in undirected graphs with non-negative edge lengths. The algorithm incurs $O(\sqrt{(nm \log w)}/B+(m/B) \log n +MST (n, m))$ memory transfers on a graph with n vertices, m edges, and real edge lengths between 1 and W; B denotes the cache block size, and $MST(n, m)$ denotes the number of memory transfers required to compute a minimum spanning tree of a graph with n vertices and m edges. Our algorithm is the first cache-oblivious shortest-path algorithm incurring less than one memory transfer per vertex if the graph is sparse ($m = O(n)$) and $W = 2^{o(B)}$.