Addendum to
Exact and approximate distances in graphs – a survey

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After the preparation of the camera ready version of the survey, a paper by Pettie and Ramachandran [1] was brought to my attention. Pettie and Ramachandran [1] also define the addition-comparison model and make a further distinction between RAM and pointer machine algorithms. Their main result is an algorithm for the all-pairs shortest paths (APSP) problem for *undirected* graphs which runs on a pointer machine in $O(mn\alpha(m,n))$ time while making only $O(mn \log \alpha(m,n))$ additions and comparisons. (Here m is the number of edges, n is the number of vertices, and $\alpha(m,n)$ is Tarjan's inverse-Ackermann function.) The main ingredient used to obtain this new algorithm is a single-source shortest paths (SSSP) algorithm for undirected graphs with positive edge weights that runs in $O(m\alpha(m,n) + n \log\log R)$ time on a pointer machine, where R is the ratio between the maximum and minimum edge weights. They also obtain an algorithm for the SSSP problem in directed graphs that runs in $O(m + n \log R)$ time on a pointer machine.

References

1. S. Pettie and V. Ramachandran. Computing shortest paths with comparisons and additions. Technical Report UTCS TR-01-12, Department of Computer Sciences, The University of Texas at Austin, 2001. http://www.cs.utexas.edu/users/vlr/papers/sp01.ps.