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**A simple approach to nondecreasing paths.** (English) Zbl 07256098  
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**Summary:** We present a simple reduction of the problem of nondecreasing paths (with minimal last edge weight) in a directed edge-weighted graph to a reachability problem in a directed unweighted graph. The reduction yields an alternative simple method of solving the single-source nondecreasing paths problem in almost linear time. If the edge weights are integers then our algorithm can be implemented in  $O((n+m)\sqrt{\log \log n})$  time on the word RAM, where  $n$  and  $m$  stand for the number of vertices and edges in the input graph, respectively. By using the reduction, we obtain also a simple algorithm for the all-pairs nondecreasing paths problem. It runs in  $\tilde{O}(n^\omega \min\{aw_G^\omega, W_G\})$  time, where  $aw_G$  denotes the average number of distinct weights of edges incident to the same vertex while  $W_G$  stands for the total number of distinct edge weights in the input graph  $G$ , and  $\omega$  is the exponent of fast matrix multiplication.

**MSC:**

68Q Theory of computing

**Keywords:**

graph algorithms; nondecreasing paths; time complexity

**Full Text:** [DOI](#)

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