

## Introduction

This report outlines and analyses an implementation of a parallel algorithm for the following problem: Given a grid, where each square has a positive integer as its cost, find the shortest 8 connected path from the top left most square to the bottom right most square, where the distance of a path is defined as the sum of costs of all squares on the path.

The algorithm I've devised is a modified version of the delta stepping algorithm from Mayer and Sanders [1], described in the following pseudocode:

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$$\begin{aligned}x_{end} &\leftarrow x_{size} - 1 \\y_{end} &\leftarrow y_{size} - 1 \\distance(0, 0) &\leftarrow cost(0, 0)\end{aligned}$$

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## References

- [1] U. Meyer and P. Sanders, "`Δ-stepping: A parallelizable shortest path algorithm,'" *Journal of Algorithms*, vol. 49, no. 1, pp. 114–152, 1998, 1998 European Symposium on Algorithms, ISSN: 0196-6774. DOI: [https://doi.org/10.1016/S0196-6774\(03\)00076-2](https://doi.org/10.1016/S0196-6774(03)00076-2). [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S0196677403000762>.