

Online Motion Planning, SS 17
Exercise sheet 5
University of Bonn, Inst. for Computer Science, Dpt. I

- You can hand in your written solutions until Wednesday, 23.5., 14:15, postbox in front of room E.01 LBH.
- We allow (and recommend) fixed groups of 2 students.
- Please subscribe to our mailing list:
<https://lists.iai.uni-bonn.de/mailman/listinfo.cgi/vl-online>

Exercise 13: Shortcut Algorithm Example (4 points)

Execute the Shortcut algorithm for the example depicted in Figure 1. For any step notate the boundary edges, the currently blocked edges and the jump edges. Calculate the overall exploration cost.

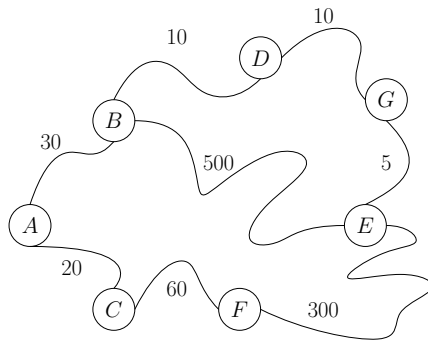


Figure 1: Apply the Shortcut algorithm for start vertex A

Exercise 14: Shortcut Algorithm Analysis (4 points)

1. Give a proof for the δ that minimizes $f(\delta) = 2(2 + \delta)(1 + 2/\delta)$. Explain its usage in the proof of the analysis of the Shortcut algorithm.
2. Explain why it is correct to successively substitute $R(x, y)$ by (x, y) for obtaining the bound $|C| \leq |R|/\delta$ for $C = (P \cup MST) \setminus MST$ and $2MST = R$ and the set of charged edges P in the Shortcut algorithm and its analysis.

Exercise 15: Proof detail ccw-order turn (4 points)

In the lecture there was a proof that shows that a curve from \mathcal{K} cannot have a self-intersection. We considered the case of a clockwise turn. Now consider the case of the counterclockwise turn (as in Figure 2) and analogously give the proof.

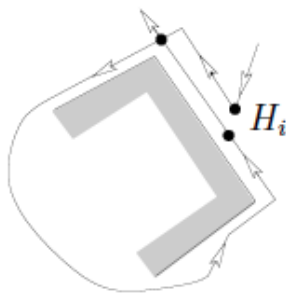


Figure 2: A counterclockwise loop and an intersection!