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The Interplay Between Local and Global Strategies in Navigational Decisions

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Abstract

Although the Traveling Salesman Problem (TSP) is an NP-hard problem, human schedulers can find strategies that are comparable if not better than existing algorithms. However, it is still unclear what heuristics they adopt in order to select an approximate solution (Schaefer, 2018). In solving a navigational problem in 3D, the directional heading is an essential factor because changes of direction require additional energy expenditure. In our study, we focus on the connection between local choices minimizing distance and local choices minimizing the turning angle. We then examine human solutions to the TSP in light of the tradeoff between local and global optimization of distance and turning angle. We conducted two experiments showing that while subjects were more likely to move to the nearest node when they plan the next step ahead, they also take the turning angle into consideration and overall adopt a strategy that combines local and global heuristics.