Capturing Hiders with Moving Obstacles

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Abstract

The classic hide-and-seek game is an abstraction for many real- world scenarios like capturing intruders in a closed space, locating objects, patrolling an area, etc. Since most of the present work is based on static obstacles, we address solutions for the hide-and- seek game in an environment where the obstacles are not static. We design strategies that would facilitate seekers to capture hiders in an environment with moving obstacles. We have three strategies: Baseline strategy, Set-cover strategy, and Sweep strategy, which use different surveillance techniques to be followed by the seekers. We simulate the methods and compare their performance in different scenarios. While the baseline strategy demands many seekers in large environments, the other two strategies, set-cover and sweep, are ideal for applying in large environments as they require fewer seekers in the same environment.

Video Demonstartion

Simulator Code and Full Paper

Results

We conducted simulations to compare the set-cover and sweep surveill- ance strategies for finding hiders in a large environment. To avoid quickly capturing all hiders, the number of seekers assigned to coverage points in the set-cover strategy was intentionally lower than what would be optimal. The experimental results, as shown in Table 1, indicate that the set-cover strategy can effectively capture targets in a large environment even with fewer seekers available. However, it requires a higher number of seeker agents compared to the sweep strategy, which proves to be more efficient in terms of seeker requirements and game completion time. Overall, the study concludes that the sweep strategy offers better performance in terms of capturing hiders while requiring fewer seekers.

Obstacle Movement	Set-Cover (3792)			Sweep (577)
	20%	50%	80%	
Random	2297	1347.5	1071	746.5
Hider Friendly	3234.75	1921	1515.3	1023.71
Seeker Friendly	1369.26	884.741	674.11	618.08

Table 1: Median Game Completion Steps in a 100 x 100 grid across 50 game rounds. The average number of seekers required by each strategy is given in brackets.

Presentation Slides

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