Covering Orthogonal Art Galleries with Sliding k-transmitters

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Abstract

The problem of guarding orthogonal art galleries with sliding cameras is a special case of the well-known art gallery problem when the goal is to minimize the number of guards. Each guard is considered as a point, which can guard all points that are in its visibility area. In the sliding camera model, each guard is specified by an orthogonal line segment which is completely inside the polygon. The visibility area of each sliding camera is defined by its line segment.

Inspired by advancements in wireless technologies and the need to offer wireless services to clients, a new variant of the problems for covering the regions has been studied. In this problem, a guard is modeled as an omnidirectional wireless modem with an infinite broadcast range and the power to penetrate up to k walls to reach a client. One of the problems that we study is the problem of covering orthogonal polygons with sliding cameras with the power to penetrate up to k walls. The goal in this problem is to place some k-transmitters in the polygon such that their cardinality or the total length of their line segments is minimized.

After finding the set of sliding cameras which can guard an orthogonal art gallery, the important problem is how to move these sliding cameras along their line segments to guard the art gallery. So, we study the problem of motion path planning for a group of sliding robots to guard an art gallery. In this problem, suppose that some unpredictable, moving evaders that have unbounded speed are inside the orthogonal polygon. The goal is to find the motion path planning for one or more sliding robots to find the evaders. We study this problem in an x-monotone orthogonal polygon and also in a simple orthogonal polygon, and present polynomial time algorithms for guarding them.

Biography

Salma Sadat Mahdavi received her PhD in computer science from Sharif university in 2020. Her research interests include theoretical computer science, randomized and approximation algorithm, computational geometry, robotics.