Abstract

Consider a small number of *scouts* exploring the infinite d-dimensional grid with the aim of hitting a hidden target point. Each scout is controlled by a probabilistic finite automaton that determines its movement (to a neighboring grid point) based on its current state. The scouts, that operate under a fully synchronous schedule, communicate with each other (in a way that affects their respective states) when they share the same grid point and operate independently otherwise. Our main research question is: How many scouts are required to guarantee that the target admits a *finite mean hitting time*? Recently, it was shown that $d + 1$ is an upper bound on the answer to this question for any dimension $d \geq 1$ and the main contribution of this paper comes in the form of proving that this bound is tight for $d \in \{1, 2\}$.