Capture Time in Variants of Cops & Robbers Games

Natasha Komarov

Abstract

We examine variations of cops and robbers games on graphs. Our goals are to introduce some randomness into their study, and to estimate (expected) capture time. We show that a cop chasing a random walker can capture him in expected time $n + o(n)$. We also discuss games in which the players move in the dark (showing that a cop can capture an immobile hider in time n on any graph and any robber in time n on K_n) and in which the players suffer various restrictions on their movements. Finally, we consider open problems, including the idea of a patrolling scheme—that is, a plan for the "beat" a cop ought to walk on a graph in order to maximize the danger for the robber of committing a crime at any given location.