Cops and Robber with Road Blocks

Matthew Musson
Mathematics and Statistics, University of Calgary
mmusson@math.ucalgary.ca

Abstract

The game of Cops and Robber is played on a finite undirected graph G. First, the cop starts by placing himself at a vertex of his choice; then the robber does the same. After that, the two players alternate (beginning with the cop) moving to an adjacent vertex, or choosing not to move. The cop wins the game if he can capture the robber, that is, occupy the same vertex as the robber on any given move. The robber wins if he is able to avoid being captured indefinitely. There have been many versions of the game since its original development; some have more than one cop, some have tools at the cops disposal - such as alarms, security cameras, and other traps at a vertex. Today we present a new version of the game. We introduce a new tool for the cop to use in his pursuit of the robber. We give the cop road blocks, which we represent as deletion of an edge in the graph from the viewpoint of the robber. In this talk we give full details of this new setup, provide an algorithm for solving this problem for trees, provide a general conjecture and discuss results surrounding it, and discuss future work.