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GRAPH DIVISION GAMES

Motivated by the controller placement problems in software-defined networks and the fair division principles of classical “cake cutting”, we investigate the following two-player zero-sum game. In our model, a defender places a limited number of controllers on graph vertices, while an attacker deletes a limited number of vertices. The defender score is the total number of surviving vertices reachable from any remaining controller. We formalize the computational problems associated with various game dynamics (defender plays first; attacker plays first; players play simultaneously; pure or mixed strategies). We show that these natural problems are NP-complete or even Σ_2^P -complete, depending on the specific variant.

This is joint work with Konstanty Junosza-Szaniawski, Antonio Lauerbach, and Alexander Wolff.