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Distance-Restricted Firefighting on Finite Graphs

In the classic version of the game of firefighter, on the first turn a fire breaks out on a vertex in a graph G and then k firefighters protect k vertices. On each subsequent turn, the fire spreads to the collective unburnt neighbourhood of all the burning vertices and the firefighters again protect k vertices. Once a vertex has been burnt or protected it remains that way for the rest of the game. We previously introduced the concept of *distance-restricted firefighting* where the firefighter's movement is restricted so they can only move up to some fixed distance d and they may or may not be permitted to move through burning vertices. In this talk we establish the NP-Completeness of the distance-restricted versions of the *Maximum Vertices Saved* problem as well as covering some interesting properties of the *Expected Damage* function. This is joint work with David Pike, Andrea Burgess, and Verafin Inc. as part of the Mitacs Accelerate Program.