# Firebreaking and Firefighting

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In the classic firefighter game, a fire burns and firefighters defend in turns. Motivated by a practical epidemiological question, we defined a one-shot version of this game, and plan to discuss both some new progress on firefighting and this one-shot version: the FIREBREAK problem.

Suppose we have a network that is represented by a graph $G$. Potentially a fire (or other type of contagion) might erupt at some vertex of $G$. We are able to respond to this outbreak by establishing a firebreak at $k$ other vertices of $G$, so that the fire cannot pass through these. fortified vertices. The question that now arises is which $k$ vertices will result in the greatest number of vertices being saved from the fire, assuming that the fire will spread to every vertex that is not fully behind the $k$ vertices of the firebreak. This is the essence of the FIREBREAK decision problem, which is the focus of this talk. We establish that the problem is intractable on the class of split graphs as well as on the class of bipartite graphs, but can be solved in linear time when restricted to graphs having constant-bounded treewidth, or in polynomial time when restricted to convenient classes of intersection graphs.