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Multilayer cops-and-robbers

(joint work with Will Pettersen, John Sylvester, and Kitty Meeks)

Multilayer graphs are graphs with multiple edge sets on a single vertex set. For example, consider a graph in which towns or neighbourhoods are vertices and different edge sets are different ways of getting between them: one edge set might be links by rail or underground, another geographic adjacency, and another fast road links. We have been studying the game of cops-and-robbers on multilayer graphs. Here, we allow each cop to move on only one layer but allow the robber to freely move on edges from any layer - from our previous analogy cops are restricted to just one mode of transport each, but robbers may use any combination. We have been interested in various problems, including a multilayer version of cop-number and optimal cop allocation between layers.

After giving several motivating examples that initially confounded our intuition, I will report on hardness results for determining multilayer cop number and performing cop allocation. I will also outline a positive relating the multilayer cop number and the treewidth of the graph on which the robber moves.