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Herding logical cats with Rabin's Theorem

In the game of Cat Herding on a graph, one player (the herder) will omnipresently delete edges, while the other player (the cat) is on a vertex of the graph, and will move along any path to a new vertex. The cat's objective is to avoid capture, while the herder tries to hasten it. In an optimally played game on a finite graph, the number of cuts the herder made to isolate the cat is the cat number of the graph.

We discuss automata theory, formal logic, and how these ideas can be used to solve an infinite version of the cat herding game. In particular, we find an equivalence between certain logical sentences and cat-win structures. Using this equivalence with Rabin's Theorem, we obtain a finite time algorithm for identifying cat-win infinite trees and an explicit (trans-finite) herder strategy for herder-win infinite trees. Time-permitting, we may also discuss applications of automatic techniques to the firefighting problem.