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Average Unmonitored Time in the Watchman's Walk Problem

The Watchman's Walk Problem is to find an optimal collection of walks (i.e. a "strategy") for one or more guards in a graph, so that each vertex is "monitored" (either on a walk or adjacent to a vertex on a walk), with the general goal of minimizing the length of time vertices are unmonitored. The vertices are monitored and unmonitored for various intervals during the strategy's period (LCM of all walk lengths). Each vertex has a longest unmonitored interval; ranging over all vertices, we can find the maximum unmonitored interval length for the graph. Most previous research has defined an optimal strategy as one which minimizes this maximum. This talk (joint work with Fatemeh Ghorbanivashki and Danny Dyer) introduces an alternative optimization: minimizing the *average* of the longest unmonitored intervals across all vertices. We investigate this average for various types of strategies (shared, disjoint, mixed) on paths and other simple trees.