There are numerous applications (e.g., video-surveillance, cyber-security) in which a large number of observations are reported by sensors or analytic programs.

This paper discussed two problems. First, we discuss PASS (Parallel Activity Search System). Given a set $S$ of stochastic automata representing activities, PASS tries to identify instances of those activities on high throughput observation streams (~ 500K obs/sec). We define a set of data structures and algorithms to achieve this. PADUA (Parallel Algorithms for Detection of Unexplained Activities) takes a variant of $S$ called penalty graphs and tries to identify sequences of observation data (possibly with extraneous observations in them) that are “inconsistent” with all known activities in $S$. These are new and unexplained activities (either good or dangerous). We report on the results of experiments with PADUA for identifying unexplained activities.

[Joint work with Andre Pugliese, Topher Thomas, Cristian Molinaro, Antonio Picariello, Vincenzo Moscato, and Fabio Persia]

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