A Fast Algorithm for Permutation Pattern Matching Based on Alternating Runs

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The PERMUTATION PATTERN MATCHING (PPM) problem asks whether a permutation P can be matched into a permutation T, i.e. whether T conatins P as pattern. It is known that PPM is in general NP-complete. However, when restrictions are made on the input instance efficient algorithms are known. For instance in the case that the pattern P is a separable permutation, PPM can be solved in polynomial time. In this talk I present the first algorithm that improves upon the $O^*(2^n)$ runtime required by brute-force search without imposing restrictions on P and T. The algorithm exploits the decomposition of permutations into alternating runs and has an exponential worst-case runtime of $O^*(1.79^{run(T)})$, where $run(T)$ denotes the number of alternating runs of T. It thus performs particularly well when the involved permutations have few alternating runs.

This talk is based on joint work with Martin Lackner.