Finding patterns in permutations

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For two permutations σ and π, we say that σ contains a copy of the pattern π, if there is a subset (not necessarily consecutive) of elements in σ, whose relative order is the same as in π. For example, if $\pi = (123)$, then a copy of π in σ amounts to an increasing subsequence in σ of length 3.

It was shown by Guillemot and Marx that a copy of a permutation π of fixed length k can be found in σ in linear time. However, how quickly can one find such a pattern if guaranteed that σ contains *many* disjoint copies of π (at least εn such disjoint copies, for some $\varepsilon > 0$)?

The answer to this question turns out to be quite surprising, underlying multiple interesting phenomena. In this talk I will discuss some of these phenomena, such as a heavy dependence on the structure of the pattern and the amount of adaptivity of the algorithm (shown by Newman, Rabinovich, Rajendraprasad and Sohler), a new parameter for permutations naturally emerging in this problem, and the very curious case of the pattern $\pi = (12 \ldots k)$.

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