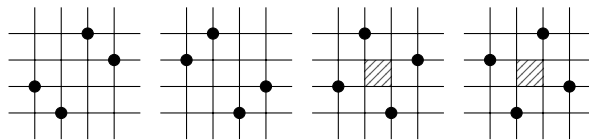


# Automated discovery of permutation patterns

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A substantial amount of research has been devoted to showing that many properties of permutations, as well as objects related to them, are captured by permutation patterns. Examples include properties such as sorting through various devices and smoothness properties of Schubert varieties. Often one needs generalized notions of patterns like barred, vincular and mesh patterns. We have developed an algorithm that takes as input a finite set of permutations and outputs the minimal patterns that the set avoids. Here minimality means that any other pattern avoided by the set of permutations is a consequence of the outputted patterns. This ensures that we get a concise description. The algorithm can for instance discover the description of stack-sortable permutations in terms of avoidance of 231, West-2-stack-sortable permutations in terms of one classical and one barred pattern, forest-like permutations (corresponding to factorial Schubert varieties) in terms of one classical pattern and one vincular pattern. Since the algorithm only takes finite sets of permutations as input, it can never prove that the description it finds is the correct one. One example of a new conjecture the algorithm has generated is that permutations whose Young tableaux (under the RSK-correspondence) are hook-shaped are the permutations avoiding four patterns:



We will discuss the implementation of the algorithm (in Sage ([www.sagemath.org](http://www.sagemath.org))).

This is joint work with Anders Claesson.