

How to recover a (monodromy) group from an error-prone sampling procedure

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The following heuristic algorithm is a popular method for computing monodromy groups of enumerative problems on a computer: generate several random monodromy permutations using numerical homotopy continuation and return the group generated by the results. The inclusion of even a single error in this generating set likely produces a "giant" permutation group, and so this algorithm can be very unreliable amidst the numerical errors involved in path-tracking. I will discuss several methods for circumventing this error-sensitivity. In particular, I will discuss how theorems from probabilistic group theory help us design algorithms for recovering information about permutation groups from error-prone sampling procedures, like homotopy continuation. Under simplifying assumptions, I will quantify the reliability of our algorithms and showcase them on examples.

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