

Computational Group Theory

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(1) Permutation groups.

Introduce permutation groups and exhibit the most fundamental algorithm for them: the orbit-stabilizer algorithm. As application we determine how many states the Rubik's cube can take.

(2) Solvable groups.

Introduce solvable and simple groups and describe a method to check if a group is solvable. Further, we investigate algorithms to analyse the structure of a group. As application we analyse the structure of the Rubik's cube group.

(3) Classification of groups.

How many groups of a given order n are there? This is a very difficult question in group theory and a complete answer is unknown. This talk gives a survey on available classifications.

(4) Matrix groups.

Introduce matrix groups and exhibit methods to investigate them. In particular, we discuss how one can determine if a given matrix group is finite.

(5) Finitely presented groups.

Introduce finitely presented groups and discuss what one can do with them. This talk connects to theoretical computer science and their methods.