

The Optimality Program in Parameterized Algorithms

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Parameterized complexity analyzes the computational complexity of NP-hard combinatorial problems in finer detail than classical complexity: instead of expressing the running time as a univariate function of the size n of the input, one or more relevant parameters are defined and the running time is analyzed as a function depending on both the input size and these parameters. The goal is to obtain algorithms whose running time depends polynomially on the input size, but may have arbitrary (possibly exponential) dependence on the parameters. Moreover, we would like the dependence on the parameters to be as slowly growing as possible, to make it more likely that the algorithm is efficient in practice for small values of the parameters. In recent years, advances in parameterized algorithms and complexity have given us a tight understanding of how the parameter has to influence the running time for various problems. The talk will survey results of this form, showing that seemingly similar NP-hard problems can behave in very different ways if they are analyzed in the parameterized setting.