

Fixed-parameter algorithms: circumventing intractability by exploiting input structure

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Abstract. This lecture introduces basic concepts and techniques for developing fixed-parameter algorithms, a recent approach to optimally solving NP-hard problems. NP-hard problems presumably cannot be solved optimally within a worst-case running time that grows polynomially with the input size. Yet it is often possible to derive so-called fixed-parameter algorithms, whose running time grows polynomially or only linearly with the input size and exponentially only with respect to other instance parameters. Thus, fixed-parameter algorithms lead to efficient algorithms for NP-hard problems in applications where these parameters are small, for example, logarithmic in the input size.