Parameterized Approximation Algorithms

Parameterized complexity measures the complexity of solving problems with multiple input parameters. This paradigm is motivated by the observation that there exist hard problems that (most likely) require exponential running time when complexity is measured in terms of the input size only, but that are computable in time that is polynomial in the input size and exponential in a (small) parameter $k$. Hence, if $k$ is fixed at a small value, such problems can still be considered ‘tractable’, despite their traditional classification as ‘intractable’.

When designing approximation algorithms, we relax the requirement that the algorithm produces an optimal solution, and the aim is to develop a polynomial-time algorithm with some worst case bound on the solution quality. The seminar will focus on parameterized approximation algorithms, which combine the two paradigms to obtain better approximations for NP-hard optimization problems, allowing the running time to be super-polynomial in a given parameter.

The seminar suits best for senior undergraduate students and graduate students.