Planar Graphs - Spring 2014 **Spencer Gordon(slg1)**

Abstract

Parameterized algorithms are algorithms that depend on more than one input, and an alternative name for the field of parameterized algorithms and complexity is multivariate algorithms. Some problems that are intractable from the perspective of classical complexity theory turn out to be far more reasonable when more than a single input parameter is considered. For example, VertexCover, a canonical NP-complete problem, has no polynomial solution unless P = NP. However, using the techniques developed for fixed-parameter algorithms we can solve the decision version of VertexCover in $2^k n^{O(1)}$ time, where k is the maximum size vertex cover desired. Since k is generally far smaller than n, we can actually get massive improvements over the naive $O(n^k)$ algorithm in lots of practical cases. I introduce the theory and practice of fixed-parameter tractability using many examples, and discuss some techniques for developing randomized fixed-parameter algorithms.