COLORING NON-UNIFORM HYPERGRAPHS: A FIRST ALGORITHMIC APPROACH TO THE GENERAL LOVÁSZ LOCAL LEMMA

Abstract

The Lovász Local Lemma is a sieve method to prove the existence of structures with certain prescribed properties. In most of its applications, the Lovász Local Lemma does not supply a polynomial-time algorithm for finding these structures. Beck was the first who gave a method of converting some of these existence proofs into efficient algorithms. He applied his technique to the symmetric form of the Lovász Local Lemma and, in particular, to the problem of 2-coloring uniform hypergraphs.

My talk will concentrate on the general form of the Lovász Local Lemma. In particular, I will describe a randomized algorithm for 2-coloring non-uniform hypergraphs that runs in expected linear time. Even for uniform hypergraphs no algorithm with such a runtime bound was previously known, and no polynomial-time algorithm was known at all for the class of non-uniform hypergraphs I will consider.