

Lower Bounds for Boolean Circuits: Open Problems

Alexander S. Kulikov

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To prove that $P \neq NP$, it suffices to construct a family of Boolean functions in NP that does not have circuits of polynomial size, that is, to prove a superpolynomial lower bound on circuit size. Proving such lower bounds is a notoriously difficult problem: we don't even know how to prove a $4n$ lower bound for a Boolean function with n inputs, let alone superlinear or superpolynomial lower bounds.

In this talk, we will review known lower bounds and approaches for proving circuit lower bounds. We will then state various open problems that could potentially lead to improved lower bounds.

The talk does not assume any prior knowledge in circuit complexity or complexity theory.