Nearly Optimal Derandomization Under Assumptions

Abstract:

Existing proofs that deduce $\text{BPP}=\text{P}$ from circuit lower bounds convert randomized algorithms to deterministic algorithms with a large polynomial slowdown. We convert randomized algorithms to deterministic algorithms with nearly minimal slowdown. Specifically, assuming exponential lower bounds against non-deterministic circuits we convert randomized algorithms that err rarely to deterministic algorithms with a similar run-time, and general randomized algorithms to deterministic algorithms whose run-time is slower by only a nearly linear factor. Our results follow from a new connection between pseudo-entropy generators and locally list recoverable codes.

This is joint work with Dean Doron, Justin Oh and David Zuckerman