

Comment on TR07-090

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Abstract

The result of the paper can be deduced from already known results in [ST06] and [BHR05].

1 Main

After publishing the paper in ECCC, it has come to my attention that the result proven in the paper, lower bounds for adaptive linearity tests, can be deduced from already known results.

As stated in the paper, the lower bound for non-adaptive linearity tests was proven by Samorodnitsky and Trevisan in [ST06], where they prove that the Complete Graph Test is optimal among all non-adaptive linearity tests.

Ben-Sasson, Harsha and Raskhodnikov have proved in [BHR05] that any adaptive linearity test with query complexity q , completeness c and soundness s can be transformed into a non-adaptive linearity test with the same query complexity, perfect completeness and soundness $s' = s + 1 - c$. The combination of the two results shows optimality of the Complete Graph Test among adaptive tests as well.

We comment that the proof technique of the paper is simpler and more direct than the one used in [ST06]. We also study, like [ST06], the behavior of linearity tests on quadratic functions. However, instead of analyzing the Gowers Norm of certain functions, we provide a more direct combinatorial proof, studying the behavior of linearity tests on random quadratic functions. This proof technique also lets us prove directly the lower bound also for adaptive linearity tests.

A new paper relating to this will be posted in ECCC shortly.

References

- [BHR05] E. Ben-Sasson, P. Harsha and S. Raskhodnikov. Some 3CNF properties are hard to test. *SIAM Journal on Computing*, 35(1):1–21, 2005. Preliminary Version in Proc. of STOC 2003.
- [ST06] A. Samorodnitsky and L. Trevisan. Gowers uniformity, influence of variables, and PCPs. In *Proceedings of the 38nd ACM symposium on Theory of Computation*, pages 11-20, 2006.