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On testing expansion in bounded-degree graphs. (English) [Zbl 1343.68302](#)

Goldreich, Oded (ed.), Studies in complexity and cryptography. Miscellanea on the interplay between randomness and computation. In collaboration with Lidor Avigad, Mihir Bellare, Zvika Brakerski, Shafi Goldwasser, Shai Halevi, Tali Kaufman, Leonid Levin, Noam Nisan, Dana Ron, Madhu Sudan, Luca Trevisan, Salil Vadhan, Avi Wigderson, David Zuckerman. Berlin: Springer (ISBN 978-3-642-22669-4/pbk). Lecture Notes in Computer Science 6650, 68-75 (2011).

Summary: We consider testing graph expansion in the bounded-degree graph model. Specifically, we refer to algorithms for testing whether the graph has a second eigenvalue bounded above by a given threshold or is far from any graph with such (or related) property.

We present a natural algorithm aimed towards achieving the foregoing task. The algorithm is given a (normalized) eigenvalue bound $\lambda < 1$, oracle access to a bounded-degree N -vertex graph, and two additional parameters $\epsilon, \alpha > 0$. The algorithm runs in time $N^{0.5+\alpha}/\text{poly}(\epsilon)$, and accepts any graph having (normalized) second eigenvalue at most λ . We believe that the algorithm rejects any graph that is ϵ -far from having second eigenvalue at most $\lambda^{\alpha/O(1)}$, and prove the validity of this belief under an appealing combinatorial conjecture.

For the entire collection see [\[Zbl 1220.68005\]](#).

MSC:

[68W20](#) Randomized algorithms

[05C85](#) Graph algorithms (graph-theoretic aspects)

Cited in **1** Review
Cited in **31** Documents

Keywords:

[property testing](#); [graph expansion](#)

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