

Seminar on Algorithms and Geometry – Handout 9

Robert Krauthgamer

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Today's topics

Today Yariv will present a paper of Spielman and Teng about graph separators.

Course Wrap-up

There are many relevant topics, including different questions, application areas, and techniques, which are often related to each other in surprising ways. Here is a partial list of topics that we did not discuss in the course, or only touched upon.

- Networking problems, e.g. spanners, distance labeling, routing schemes, and network triangulation.
- Specific metrics e.g. edit distance, Earthmover distance, sparse vectors.
- Restricted families of metrics e.g. planar or low-dimensional manifolds.
- Machine learning tasks e.g. variants of NNS and online learning (regret minimization).
- Approximation algorithms for combinatorial optimization e.g. clustering, classification, and several graph partitioning problems, including rounding of LP and SDP.
- Applications of isoperimetric inequalities e.g. to SDP integrality gaps.
- Embeddings into spaces of low (intrinsic) dimension
- Decomposition of metric spaces
- Lipschitz extension problems
- Local-global phenomena

Open Problems. Matousek compiled a list of open problems [Mat02]. Here is another one related to last week's class.

Q1. Can every Euclidean subset $S \subset \ell_2$ embed with constant distortion into ℓ_2^k where k depends only on the doubling constant of S ? What about $1 + \varepsilon$ distortion?

References

- [Mat02] J. Matoušek. Open problems on low-distortion embeddings of finite metric spaces. *Available at <http://kam.mff.cuni.cz/~matousek/metrop.ps>*, 2002. Revised March 2007.