MSc thesis defense presentation

Λουκ■ς Κ■βουρας defends his MSc thesis

Date:	Τρ■τη, 08 Νο■ 2016
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Location:	Εθνικ■ και Καποδιστριακ■ Πανεπιστ■μιο Αθην■ν, Τμ■μα Πληροφορικ■ς και Τηλεπικοινωνι■ν, Α56
Thesis title:	High dimensional approximate r-nets
Committee:	• Ιω■ννης Εμ■ρης • Δημ■τρης Φωτ■κης • Αριστε■δης Παγουρτζ■ς

Thesis abstract

The construction of r-nets offers a powerful tool in computational and metric geometry. We focus on high-dimensional spaces and present a new randomized algorithm which efficiently computes approximate r-nets with respect to Euclidean distance. For any fixed $\epsilon>0$, the approximation factor is $1+\epsilon$ and the complexity is polynomial in the dimension and subquadratic in the number of points. The algorithm succeeds with high probability. More specifically, the best previously known LSH-based construction of Eppstein et al.\ \cite{EHS15} is improved in terms of complexity by reducing the dependence on ϵ, provided that ϵ is sufficiently small. Our method does not require LSH but, instead, follows Valiant's \cite{Val15} approach in designing a sequence of reductions of our problem to other problems in different spaces, under Euclidean distance or inner product, for which r-nets are computed efficiently and the error can be controlled. Our result immediately implies efficient solutions to a number of geometric problems in high dimension, such as finding the $(1+\epsilon)$-approximate kth nearest neighbor distance in time subquadratic in the size of the input.