

# MSc thesis defense presentation

## Λουκίας Κβουρας defends his MSc thesis

<b>Date:</b>	Τρτη, 08 Νο 2016
<b>ωρα:</b>	14:00
<b>Location:</b>	Εθνικ και Καποδιστριακ Πανεπισμιο Αθην, Τμμα Πληροφορικ και Τηλεπικοινωνι, Α56
<b>Thesis title:</b>	<a href="#">High dimensional approximate r-nets</a> <ul style="list-style-type: none"><li>• <a href="#">Ιωννης Εμρης</a></li><li>• <a href="#">Δημτρης</a></li></ul>
<b>Committee:</b>	<a href="#">Φωτκης</a> <ul style="list-style-type: none"><li>• <a href="#">Αριστεδης</a> <a href="#">Παγουρτζς</a></li></ul>

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### 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  $\epsilon$ , provided that  $\epsilon$  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  $k$ th nearest neighbor distance in time subquadratic in the size of the input.

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