Un exposé exceptionnel aura lieu le Vendredi 10 juin de 13h30 à 14h30, salle 260 (ESIEE PARIS).

Geometric Data: Analysis, Optimization and Visualization

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Abstract: We are given some geometric data in the form of a set P of n points in R^d. Then the aim of combinatorial data approximation is to give a succinct summary of the shape of P (e.g., spread and distribution of the points in P). This becomes especially important as the data becomes unmanageably large (e.g., coming from a live-stream), and so only a small 'sketch' can be stored. In this talk I will present various algorithms and techniques for approximating a set of points with a smaller set.
I will first present and explain the notion of a centerpoint, which is the generalization of the concept of a median to higher dimensions. I will then present fast algorithms to compute the spread of the pointset based on this notion.
A different method to approximate P is via the notion of an epsilon-net, which is a subset of P that approximates P with respect to geometric objects. A well-known theorem states that the existence of small-sized epsilon-nets for P imply constant-factor approximation algorithms for geometric hitting-set problems for P. However, the main limitation of this technique is the inability to give polynomial-time approximation schemes for these problems. I will present a different approach, based on the idea of local-search, that is able to bypass this barrier, and give PTAS for several geometric hitting-set problems.

Nabil Mustafa completed his MS and PhD degrees from Duke University in 2000, and 2004 respectively, and is currently a visiting researcher at EPFL, Switzerland. He has also worked in the algorithms and complexity research group at the Max-Planck Institute, and the graphics and visualization group at AT&T Research Labs. His research interests are in Algorithms, Discrete & Computational Geometry, and Graphics & Visualization. In 2010 he won (with his co-author) the "Best Young Researcher" Award, presented annually by the Journal "Computational Geometry: Theory and Applications".