Discrete Mathematics and Computer Science Seminars
Department of Mathematical Sciences, Sharif University of Technology

On simplicial complexes embeddable in the Euclidean space

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Salman Parsa received his BSc and MSc of Computer Science from Department of Mathematical Sciences, Sharif University of Technology and then moved on to study at Duke University, Durham, North Carolina, USA and received his PhD in 2014 under Herbert Edelsbrunner. During his PhD he also studied at IST Austria. He has been postdoc at IST Austria and ENS Paris.

Abstract

We will talk about spaces that can be embedded in the Euclidean spaces. The spaces under consideration are simplicial complexes of dimension d, and we are interested in those simplicial complexes that can be embedded in the Euclidean space of dimension 2d. For example, the case d=1 consists of planar graphs. In particular, for these spaces we intend to answer the following question. Suppose we are given a d-dimensional simplicial complex embeddable in the Euclidean space of dimension 2d and this complex has n vertices. What is the best upper bound for the number of d-simplices of the complex as a function of n? If we restrict the embeddings to simplex-wise linear functions, then we can restate the problem in the following form. Suppose we are given n points in the Euclidean space of dimension 2d. What is the maximum number of d-simplices with vertices from these points and such that any two d-simplices intersect only in a simplex of their boundary, if any. For d=1, the answer is 3n-6. However, for values of d greater than 1, the problem is open and the best bounds known are much higher than the conjectures of many. Here we discuss the best upper bounds that are achieved using new observations and with relatively simple methods. Basic algebraic topology is used in these arguments.

Wednesday, **24 Azar 1395** (14 December 2016), **12:45-14:00**
Room **317,** Department of Mathematical Sciences