



Seminar Series Supported by Jeffrey and Holly Ullman Symposium in Honor of Prof. Klara Kedem January 6, 2016

Register: <http://www.cs.bgu.ac.il/~frankel/Klara-Kedem/registration.html>

10:30 Gathering

11:00 Greeting

Jiwchar Ganor, **Dean of the Faculty of Natural Sciences,
Ben-Gurion University**

Jihad El-Sana, **Chair of the Computer Science Department,
Ben-Gurion University**

11:20 Shape Matching in Computational Geometry

Micha Sharir, **Tel Aviv University**

Abstract: In this talk I will take a personal (biased) tour through this fascinating topic, starting with works done by Klara during the 1990s on the Hausdorff distance, and ending in recent works on the Frechet distance and the partial RMS distance. The talk will present results, techniques, and open problems.

12:00 Short Break

12:05 Using Mobile Agents to Gather Data from Sensors, and
Using Stationary Sensors to Monitor Mobile Agents

Joe Mitchell, **Stony Brook University**

Abstract: In a domain with embedded sensors, we consider optimal data gathering from the sensors using a mobile agent that must either get in close proximity to sensors or come into visual contact with sensors. Symmetrically, we examine some problems of placing sensors to monitor a set of trajectories of mobile agents. Almost all of these problems are NP-hard, so our focus is on approximation algorithms.

12:45 Lunch

14:00 Proximity Queries for Image Matching in Large Scale

Dror Aiger, **Google Research**

Abstract: Proximity problems in Euclidean high-dimensional spaces find many applications in computer vision. Image structures are commonly described by points in (high-dimensional) space and one is searching for similar structures by applying proximity searching in this space. One problem is preprocessing-and-query, where the goal is to construct a data structure on the input point set which supports proximity queries (nearest neighbor(s) or range queries). Another problem is the off-line version useful in building image graphs that describe image similarities in a set of images: Given a set P of n points in a high-dimensional space R^d and a distance r , report all pairs of points in P at Euclidean distance at most r . We present two randomized algorithms; one based on randomly shifted grids, and the other on randomly shifted and rotated grids that are used for both the offline and indexing problems. We present experimental results on several large image datasets, demonstrating that our algorithms run significantly faster than existing algorithms. The algorithms are naturally parallelized by standard schemes (e.g. MapReduce) and are therefore suitable for huge sets in external memory.

14:20 Keyword Retrieval of Historical Document Images

Irina Rabaev, **Ben-Gurion University**

Abstract: The advances of digital scanning and storage technologies have dramatically increased the accessibility and availability of historical documents to the general public. However, these documents are represented as sets of images; hence computer analysis and processing is essential. In order to provide a search engine on document images, one may consider converting them into text files. However, traditional Optical Character Recognition (OCR) systems fail when applied to degraded historical manuscripts. As an alternative to OCR, a keyword spotting technique was proposed. The main idea of keyword spotting is that the search is performed on the image domain without converting the document into textual representation. The goal is to find all the images in the document which are similar to a given query image (or model).

We present our recent work for keyword spotting in grayscale historical documents. The documents are represented by a scale-space pyramid of their features. The search for a query keyword begins at the highest level of the pyramid, where the initial candidates for matching are located. The candidates are further refined at each level of the pyramid. The number of levels is adaptive and depends on the length of the query word. The results from all the document images are combined and ranked.

14:40 The Importance of Parameter K (Klara?!)

Michael Segal, **Ben-Gurion University**

Abstract: In this talk I will present several problems (from the past and current research) coming from the area of computational geometry and networking having one common thing: an input parameter K . I will show the ideas of some old, nostalgic solutions we had with Klara almost 20 years ago, and the new ones, which are still based on similar concepts.

15:00 Coffee

15:20 Closing Remarks

Klara Kedem, **Ben-Gurion University**

15:45 End of Symposium in Honor of Prof. Klara Kedem

