

# Baris Sumengen

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## EDUCATION

### **Ph.D., Electrical and Computer Engineering**

September 2004

*Electrical and Computer Engineering Department, University of California, Santa Barbara, CA*  
Dissertation title: “*Variational Image Segmentation and Curve Evolution on Natural Images*”.  
Advisor: Prof. B.S. Manjunath.

### **M.S., Electrical and Computer Engineering**

March 2000

*Electrical and Computer Engineering Department, University of California, Santa Barbara, CA*  
Curriculum Focus: Digital Signal Processing and Communications.

### **B.S., Double Major in Electrical Engineering and Mathematics**

June 1998

*Department of Electrical and Electronic Engineering, Bogazici University, Istanbul, Turkey*  
*Department of Mathematics, Bogazici University, Istanbul, Turkey*  
Thesis title: “*Computerized Cephalometric Analysis.*” Advisor: Prof. Bulent Sankur.

## EXPERIENCE

### **Post-Doctorate Researcher**

October 2004 –

*Vision Research Lab, University of California, Santa Barbara, CA*

- Devised algorithms for learning image patterns in immunofluorescence retinal images.
- Co-mentored and guided Ph.D. and undergrad students in their thesis requirements and research projects in bio-informatics and image processing.
- Designed image processing and feature extraction components and participated in the design of the architecture for a large-scale geographically distributed medical image database, which is funded by NSF.

### **Graduate Student Researcher**

August 1998 – December 2003

*Vision Research Lab, University of California, Santa Barbara, CA*

- *PhD Thesis* on “*Variational Image Segmentation and curve evolution on Natural Images*”.
- Thesis can be downloaded in pdf format from my web page.
- Developed novel and state of the art *variational techniques* for image segmentation on natural images.
- Designed efficient and effective methods for vector field driven multi-scale edge detection and image segmentation.
- Created a segmentation method by formulating graph partitioning problem as a cost function solved within variational framework (Graph partitioning active contours).
- Built a multimedia search and semantic categorization system for web images, which is successfully demonstrated on over 600,000 web images.
- Shown a successful method for pruning categories of images and eliminating outliers. General patterns are learned by utilizing segmentation and image analysis.
- Worked on the MPEG-7 standard for the design of the homogenous texture descriptor that is based on Gabor wavelets. This design has been accepted to the MPEG-7 standard.

### **Summer Intern**

June 2002 – September 2002

*Multimedia Asset Management Group, HP Labs, Palo Alto, CA*

- Worked on designing, indexing and browsing of video databases. Created an application and javascript-based interactive web interface for semi-automatic indexing of home videos, which is successfully tested on more than 30 hours of video.
- Developed a video database for easy search and retrieval of indexed contents.

## PATENTS

- “Database building method for multimedia contents,” USA Patent Application Serial No. 10/419,803. Filed April 22 2003. Korean Patent Application is also filed. Full text available at [<http://www.uspto.gov/>].
- “Method and apparatus for populating, indexing and searching a non-html web content database,” European Patent Publication No. EP1267280. Published on December 18 2002.

## PROJECTS

### Variational Image Segmentation on Natural Images

August 1998 – September 2004

Image segmentation is a key problem in almost every vision system. I designed various state of the art segmentation and edge detection techniques. Evaluations on ground truth show that my methods out-perform several well-known segmentation methods.

### Categorization of Images and Scalable Content-based image retrieval

September 1999 – December 2000

I designed a scalable system for automated image categorization and search with relevance feedback. The database includes over 600,000 web images catalogued into more than 20,000 categories. A demonstration of this semantic web image search can be accessed from my web page. The system is based on technologies such as C, Perl, Java, and Mysql.

### MPEG-7 Homogenous Texture Descriptor

September 1998 – December 1999

I worked on the design and performance evaluation phases of the Gabor wavelets-based MPEG-7 homogenous texture descriptor, which is now part of the MPEG-7 standard.

### Undergraduate Thesis - Computerized Cephalometric Analysis

January 1998 – July 1998

Cephalometry is an area in orthodontics and means scientific measurement of the head and chin structure. In this project I worked with experts from medical school to computerize their analysis by using computer vision techniques and achieved significant improvements compared to the previously manual operations.

## PUBLICATIONS

- [1] B. Sumengen and B.S. Manjunath, “Edgeflow-driven variational image segmentation: Theory and performance evaluation,” *Submitted for publication in IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*.
- [2] B. Sumengen and B.S. Manjunath, “Graph partitioning active contours (gpac),” *Accepted for publication in IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*.
- [3] B. Sumengen, S. Bhagavathy, and B.S. Manjunath, “Graph partitioning active contours for knowledge-based geo-spatial segmentation,” in *CVPR Workshop on Perceptual Organization in Computer Vision (POCV)*, 2004.
- [4] B. Sumengen, B.S. Manjunath, and C. Kenney, “Image segmentation using multi-region stability and edge strength,” in *International Conference on Image Processing (ICIP)*, 2003, pp. 429–432.
- [5] B Sumengen, B S Manjunath, and C Kenney, “Image segmentation using curve evolution and flow fields,” in *International Conference on Image Processing (ICIP)*, 2002, pp. 105–8.
- [6] B Sumengen, B S Manjunath, and C Kenney, “Image segmentation using curve evolution and region stability,” in *International Conference on Pattern Recognition (ICPR)*, 2002, pp. 965–8.
- [7] S Newsam, B Sumengen, and B S Manjunath, “Category-based image retrieval,” in *International Conference on Image Processing (ICIP)*, 2001, pp. 596–9.
- [8] B Sumengen, B S Manjunath, and C Kenney, “Image segmentation using curve evolution,” in *Asilomar Conference on Signals, Systems and Computers*, 2001, pp. 1141–5.

## INVITED TALKS AND PAPERS

- “Category-Based Image Retrieval,” Invited Paper, International Conference on Image Processing (ICIP) 2001, Thessaloniki, Greece.
- “Image Segmentation using Curve Evolution,” Image Segmentation and Frequency Domain Processing, Invited Paper and Presentation, Asilomar Conference on Signals, Systems and Computers 2001, Monterey, CA, USA.

## **PUBLIC SOFTWARE THAT I DEVELOPED**

### **Easy to Use C++ Linear Algebra Library: CIMPL**

November 2004 – January 2005

This programming library, CIMPL, is a well-designed C++ matrix and image library and it can handle most linear algebra problems. The aim of this software is to bring together the ease of use researchers expect from packages such as Matlab and the flexibility and performance of C++. Source code and binary distribution can be downloaded from my web page.

## **SKILLS**

- *Research Skills*

Conducted research, designed and implemented algorithms in the areas of image processing, pattern recognition, learning, data mining, statistical modeling, similarity search and indexing, and database design.  
Assisted in writing grant proposals in the area of computer vision and image processing.

- *Computer Skills*

Programming: C/C++, MATLAB, C#.NET, Perl, SQL, Java.

- *Verbal Skills*

Strong presentation, communication, and organization skills.  
Fluent spoken and written English, Turkish and German language.

## **PROFESSIONAL ACTIVITIES**

- *Reviewer* for:

IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)  
IEEE Transactions on Image Processing  
Signal Processing, Elsevier Science Publishers  
Journal of Mathematical Imaging and Vision, Kluwer Academic Publishers

- *Member* of Institute of Electrical and Electronics Engineers (IEEE), Association for Computing Machinery (ACM), and UCSB Alumni Association.

## **REFERENCES**

- B.S. Manjunath, Professor  
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Santa Barbara, CA 93106-9560  
E-mail: manj@ece.ucsb.edu  
Phone:(805) 893 7112
- Other references available upon request