

# Prasad Gabbur

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## EDUCATION

**PhD in Electrical and Computer Engineering**  
University of Arizona, Tucson, AZ.  
Spring 2005 – Present.  
**GPA 3.933/4.0.**

**Bachelors in Electronics and Communication Engineering**  
National Institute of Technology Karnataka, Surathkal, India.  
June 2001.  
**Aggregate 85.34%.**

**Masters in Electrical and Computer Engineering**  
University of Arizona, Tucson, AZ.  
December 2003.  
**GPA 4.0/4.0.**

## RESEARCH

- **Microarray data analysis**
  - Microarrays enable simultaneous monitoring of thousands of genes in a tissue. Methods for analyzing such data including normalization, gene selection and phenotypic state prediction have to account for both technical and biological noise in the data. I am working on evaluating the effectiveness of existing methods and developing novel methods to address these issues. New methods to incorporate Gene Ontology (GO) tags for state prediction are being explored with the help of probabilistic generative models for multimodal data. Phenotypic state prediction performance is being used to evaluate these methods.
- **Competitive Expectation Maximization**
  - Expectation Maximization is a commonly used machine learning tool in missing data problems with an application in probabilistic mixture modeling. However, it is inherently a local maximum likelihood algorithm and sensitive to initialization. Another important research problem is the automatic determination of the number of clusters. Addressing these issues, I have worked on implementing a variant of Competitive Expectation Maximization (CEM) algorithm.
- **Semantic evaluation of computer vision algorithms using word prediction performance**
  - Large databases of digital images that come with words associated with the images help to learn relationships among visual features of image regions and words. This can be used to predict words for new images automatically (auto-annotation). It has applications in content-based image indexing and retrieval. I have worked on identifying and evaluating visual features, segmentation algorithms and color constancy algorithms using word prediction performance.
- **Modifications to Normalized Cuts segmentation algorithm**
  - As part of my Master's thesis, I worked on modifying the Normalized Cuts segmentation algorithm to improve its grouping performance on images. Further, comparison of the original and modified versions of the Normalized Cuts algorithm was done using word prediction tool.
- **Human face detection and tracking in color image sequences**
  - As part of my undergraduate thesis, I worked in a group of two to develop an algorithm to detect and track human face(s) from color images/video. This was performed using statistical skin color modeling and connected component operators.

## PUBLICATIONS

- "A fast connected components labeling algorithm for real-time pupil detection," Prasad Gabbur, Hong Hua, and Kobus Barnard, **Machine Vision and Applications**, January 2009.
- "Preserving the aesthetics during non-fixed aspect ratio scaling of the digital border," Hui Chao, Prasad Gabbur, and Anthony Wiley, **ACM Symposium on Document Engineering**, pp. 144-146, 2007.
- "Cross modal disambiguation," Kobus Barnard, Keiji Yanai, Matthew Johnson, and Prasad Gabbur, in *Toward Category-Level Object Recognition*, Jean Ponce, Martial Hebert, Cordelia Schmid, eds., **Springer-Verlag LNCS** Vol. 4170, pp. 225-244, 2006.
- "Evaluation Strategies for Image Understanding and Retrieval," Keiji Yanai, Nikhil V. Shirahatti, Prasad Gabbur and Kobus Barnard, **Proc. of ACM Multimedia Workshop on Multimedia Information Retrieval (MIR)**, Singapore, November, 2005 (Invited paper).
- "Color and Color Constancy in a Translation Model for Object Recognition," Kobus Barnard, Prasad Gabbur, **IS&T/SID 11th Color Imaging Conference**, pp. 364-369, 2003.

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- “The effects of segmentation and feature choice in a translation model of object recognition,” Kobus Barnard, Pinar Duygulu, Raghavendra Guru, Prasad Gabbur, David Forsyth, **IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)**, Vol. II, pp. 675-682, 2003.
- “Human Face Detection and Tracking using Skin Color Modeling and Connected Component Operators,” Prem Kuchi, Prasad Gabbur, P. Subbanna Bhat, Sumam David, **IETE JI. of Research**, Vol. 38, No. 3&4, pp. 289-293, May-Aug 2002.

## AWARDS / MERITS

- Graduate College Fellowship, University of Arizona, Fall 2001.
- 3<sup>rd</sup> rank to the University in my undergraduate degree (2<sup>nd</sup> in a class of 75).

## EXPERIENCE

University of Arizona **Research Associate** Spring & Fall 2003, Spring 2005 - Present

- Working on microarray data analysis.
- Worked on computer vision based eye-gaze tracking for fovea contingent displays.
- Worked on image segmentation and visual features for auto-annotation using joint image-word modeling.

Hewlett Packard Laboratories **Research Associate Intern** Summer 2006

- Worked with Dr. Hui Chao on automatic content extraction and layout change in multilayer PSD images. Developed a real-time algorithm to do connected components labeling to aid in the process of automatic content extraction.

IntelliVision Technologies Corp., San Jose, CA **Software Engineer** Summer & Fall 2004

- Worked on a motion detection algorithm in video for surveillance and security applications. Evaluated performances of different color spaces (RGB, HSL, CIE L\*a\*b\* and YCbCr) in dealing with the effects of small illumination changes and weak shadows on motion detection.
- Developed DSP algorithms for a people counting system based on a planar scan infrared sensor.

Eyematic Interfaces Inc., Los Angeles, CA **Intern** Summer 2002

- Worked on using synthetic images for representing faces under varying illumination conditions for a face detection system. Rendered a database of synthetic face images simulating different illuminations using 3D Studio Max.

University of Arizona **Teaching Assistant** Fall 2001, Spring & Fall 2002

- C Programming for Engineering Applications
  - Digital Signal Processing

Indian Institute of Science, Bangalore, India **Young Engineering Research Fellow** Fall 2000

- Research on developing a computational method for human face detection and tracking in color image sequences.

## GRADUATE LEVEL COURSES

- Random Processes for Engineering Applications
- Linear Algebra
- Fundamentals of Statistical Machine Learning
- Digital Image Processing
- Computer Vision
- Information Theory
- Advanced Digital Signal Processing
- Numerical Analysis
- Computer Graphics
- Stochastic Processes
- Computer Aided Logic Design
- Linear Systems Theory

## COMPUTER SKILLS

- Languages: C, C++, HTML, Perl.
- Packages: OpenGL, MATLAB.
- Hardware Description Language: VHDL.
- Operating Systems: GNU/LINUX, MS Windows.

## REFERENCES

Available upon request.