dbatra@ttic.edu

6045 S. Kenwood Ave, Chicago IL 60637

http://ttic.uchicago.edu/~dbatra

Ph: (773) 834-2622

DHRUV BATRA

CURRENT POSITION

Research Assistant Professor September 2010 – Present
Toyota Technological Institute at Chicago
Research Interests: Machine Learning, Computer Vision, Graphical Models, Combinatorial Optimization

EDUCATION

Ph.D., Carnegie Mellon University May 2010
Thesis: "On Graph-Structured Discrete Labelling Problems in Computer Vision: Learning, Inference and Applications."
Committee: Tsuhan Chen (Advisor), Carlos Guestrin, Martial Hebert, Jose Moura, Rahul Sukthankar, Ramin Zabih

M.S., Carnegie Mellon University December 2006
Project Supervisor: Martial Hebert

B.Tech, Institute of Technology, Benaras Hindu University, India May 2005

RESEARCH EXPERIENCE

Visiting Scientist, CSAIL Massachusetts Institute of Technology, Cambridge, MA March – May 2011
Host: Bill Freeman

Intern, Microsoft Research Lab Cambridge, Cambridge, UK Summer 2010
Mentors: Sebastian Nowozin and Pushmeet Kohli
Project: Tightening LP-relaxations for MAP Inference

Visiting Student, Cornell University, Ithaca, NY Spring 2009 – Spring 2010
Mentors: Tsuhan Chen, Cornell University
Project: MRF Inference via Outer-Planar Decomposition

Intern, Kodak Research, Rochester, NY Summer 2008
Mentor: Jiebo Luo, Eastman Kodak; now Professor at University of Rochester
Project: Interactive Co-segmentation

Intern, Intel Research Lab, Pittsburgh, PA Summer 2007
Mentor: Rahul Sukthankar, Intel; (Adjunct) Faculty, Robotics Institute, CMU
Project: Learning Class-Specific Affinities for Image Labelling

Intern, Intel Research Lab, Pittsburgh, PA Summer 2006
Mentor: Bart Nabbe, Intel; (Adjunct) Faculty, Robotics Institute, CMU
Project: An Alternative Formulation for the Five Point Relative Pose Problem

Research Assistant, Vision and Mobile Robotics Lab, **Carnegie Mellon University** Fall 2005 - Fall 2006
Mentor: Martial Hebert, Professor, Robotics Institute, CMU
Project: Object Recognition via Geometrically Consistent Correspondences

Intern, R&D Group, Electronics Division, **Minda Huf Technologies Lmt.,** Delhi, India Summer 2005
Project: Developing a Fingerprint Lock for Automobile Security

Intern, Multimedia and Internet Technology Lab, **Indian Institute of Technology (IIT),** Delhi, India Summer 2004
Mentor: Santanu Chaudhury, Professor, Indian Institute of Technology (IIT) Delhi
Project: Gabor Filter based Fingerprint Classification using Support Vector Machines

DHRUV BATRA

TEACHING EXPERIENCE

Co-Instructor (co-teaching with Nati Srebro),   TTIC Machine Learning II, Spring 2012
Guest Lecturer   TTIC 31020 Intro to Statistical Machine Learning, Fall 2010

Graduate Teaching Assistant (Instructor: Carlos Guestrin)   CMU 10708 Probabilistic Graphical Models, Fall 2008

STUDENTS AND INTERNS SUPERVISED

Graduate Interns and Collaborators
- Kun Duan, Ph.D. student at Indiana University (Advisor: David Crandall)
- Daozheng Chen, Ph.D. student at University of Maryland (Advisor: David Jacobs)
- Payman Yadollahpour, Ph.D. student at TTIC (Advisor: Greg Shakhnarovich)

M.S. Projects
- Jason Lew, Cornell University
- Andrew Mui, Cornell University

Undergraduate Interns and Projects
- Kevin Tang, Cornell University (now at Stanford University)
- Tanmay Verma, Indraprastha Institute of Information Technology, Delhi
- Charvi Puri, Indraprastha Institute of Information Technology, Delhi

PUBLICATIONS / PATENTS / DEMOS / TALKS

Publications
- Dhruv Batra, Adarsh Kowdle, Devi Parikh, Jiebo Luo, and Tsuhan Chen.
  Interactive Co-segmentation of Objects in Image Collections
  SpringerBriefs in Computer Science 2011.

- Dhruv Batra, Greg Shakhnarovich.
  Similarity Sensitive Nonlinear Embeddings.
  Workshop on Kernels and Distances for Computer Vision,
  International Conference on Computer Vision (ICCV) 2011.

- Daniel Tarlow, Dhruv Batra, Pushmeet Kohli, Vladimir Kolmogorov.
  Dynamic Tree Block Coordinate Descent.
  International Conference on Machine Learning (ICML), 2011.

- Dhruv Batra, Pushmeet Kohli.
  Making the Right Moves: Guiding Alpha-Expansion using Local Primal-Dual Gaps.
  IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2011.

- Andrew Gallagher, Dhruv Batra, Devi Parikh.
  Inference for Order Reduction in Markov Random Fields.
  IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2011.

- Dhruv Batra, Sebastian Nowozin, Pushmeet Kohli.
  Tighter Relaxations for MAP-MRF Inference: A Local Primal-Dual Gap based Separation Algorithm.
  International Conference on Artificial Intelligence and Statistics (AISTATS) 2011.

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- Adarsh Kowdle, Yao-Jen Chen, Dhruv Batra, Tsuhan Chen.
  Scribble Based Interactive 3D Reconstruction via Scene Co-segmentation.
  IEEE International Conference on Image Processing (ICIP) 2011.

- Dhruv Batra, Adarsh Kowdle, Devi Parikh, Jiebo Luo, Tsuhan Chen.
  Interactively Co-segmenting Topically Related Images with Intelligent Scribble Guidance.
  International Journal of Computer Vision, 2011.

- Adarsh Kowdle, Dhruv Batra, Wen-Chao Chen, Tsuhan Chen.
  iModel: Interactive Co-segmentation for Object of Interest 3D Modeling.
  Workshop on Reconstruction and Modeling of Large-Scale 3D Virtual Environments,
  European Conference on Computer Vision, 2010 (ECCV '10).

- Dhruv Batra, Andrew Gallagher, Devi Parikh, and Tsuhan Chen.
  Beyond trees: MRF Inference via Outer-Planar Decomposition.
  IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2010.

- Dhruv Batra, Adarsh Kowdle, Devi Parikh, Jiebo Luo, and Tsuhan Chen.
  iCoseg: Interactive Co-segmentation with Intelligent Scribble Guidance.
  IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2010.

- Dhruv Batra, Tsuhan Chen.
  Dynamic Planar-Cuts: Efficient Computation of Min-Marginals for Outer-Planar Models.
  Workshop on Discrete Optimization in Machine Learning (DISCML), NIPS 2009.

- Dhruv Batra, Devi Parikh, Adarsh Kowdle, Tsuhan Chen.
  Seed Image Selection in Interactive Cosegmentation.
  IEEE International Conference on Image Processing (ICIP) 2009.

- Dhruv Batra, Adarsh Kowdle, Devi Parikh, Tsuhan Chen.
  Cutout-Search: Putting a name to the Picture.
  Workshop on Internet Vision, IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2009.

- Dhruv Batra, Rahul Sukthankar and Tsuhan Chen.
  Semi-Supervised Clustering via Learnt Codeword Distances.
  British Machine Vision Conference (BMVC) 2008.

- Dhruv Batra, Rahul Sukthankar and Tsuhan Chen.
  Learning Class-Specific Affinities for Image Labelling.
  IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2008.

- Dhruv Batra, Tsuhan Chen, and Rahul Sukthankar.
  Space-Time Shapelets for Action Recognition.
  Workshop on Motion and Video Computing (WMVC) 2008, IEEE Winter Vision Meetings.

- Dhruv Batra, Bart Nabbe, and Martial Hebert.
  An Alternative Formulation for the Five Point Relative Pose Problem.
  IEEE Workshop on Motion and Video Computing (WMVC) 2007.

- Dhruv Batra, Girish Singhal, and Santanu Chaudhury.
  Gabor Filter based Fingerprint Classification using Support Vector Machines.
  IEEE India Annual Conference (INDICON) 2004.

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Patent
- Jiebo Luo, Dhruv Batra, Andrew Gallagher.
  Method for Generating Object Cutout for Topically Related Photographs.
  Filed to USPTO in January 2009.

Demo
- Dhruv Batra, Adarsh Kowdle, Kevin Tang, Devi Parikh, Jiebo Luo, Tsuhan Chen.
  Interactive Cosegmentation by Touch.
  Demo at IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2009.

Talks
- *"Focussed Inference with Local Primal-Dual Gaps"*
  - @ Invited Talk at the Workshop on Inference in Graphical Models with Structured Potentials at CVPR (Jun 2011)
  - @ Brown University Computer Science Colloqium (May 2011)
  - @ Midwest Computer Vision Workshop at the University of Michigan, Ann Arbor (May 2011)

- *"On Graph-Structured Discrete Labelling Problems in Computer Vision."*
  - @ HP Labs Paulo Alto (Jun 2010)
  - @ UIUC CS Department (Jun 2010)
  - @ TTIC-Colloquium (May 2010)
  - @ Georgia Tech (May 2010)
  - @ UT-Austin CS Colloquium (May 2010)
  - @ MIT CSAIL (Apr 2010)
  - @ University of Georgia CS Colloquium (Apr 2010)

- *"Beyond Trees: MRF Inference via Outer-Planar Decomposition (OPD)."*
  - @ Carnegie Mellon University VASC Seminar (Mar 2010).
  - @ Illinois Vision Meet, TTIC (Dec 2009)
  - @ Toyota Technical Institute Chicago (Dec 2009)
  - @ Microsoft Research Redmond (Dec 2009)

PROFESSIONAL ACTIVITIES

Program Committee Member:
ICCV 2009, ECCV 2010, CVPR 2011, ICCV 2011, IJCAI 2011, EMMCVPR 2011, Workshop on Optimization in Machine Learning at NIPS 2011.

Reviewer for Journals:
IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)
International Journal of Computer Vision (IJCV)
Image and Vision Computing

SKILLS, HONOURS AND INTERESTS

Honours:
Chairman, IEEE Student Chapter, IT-BHU (2004-05)
IT-BHU squash team member (2004-05)

Other Interests:
Squash – Competed in the Pittsburgh Squash Racquets Association (PSRA) Box League.
Long Distance Running – Ran the Ithaca Half Marathon 2010, Chicago Marathon 2011.
Fluent in English, Hindi; (basic) Punjabi; studied Sanskrit (6 yrs), Spanish (2 yrs)