Subhransu Maji

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Research areas

My research focuses on computer vision with a particular emphasis on algorithms for high-level recognition. My goal is enable cheap and robust sensing of the visual world using cameras powered by computer vision.

Education

Doctor of Philosophy, with designated emphasis in *"Communication, Computation, and Statistics"*
Thesis: Algorithms and Representations for Visual Recognition
University of California at Berkeley, 2006 – 2011
Thesis advisor: Jitendra Malik

Bachelor of Technology
Computer Science and Engineering Department
Indian Institute of Technology, Kanpur, India. 2002 – 2006
Computer Science and Engineering Department Topper

Employment and academic positions

University of Massachusetts, Amherst, Assistant Professor
Amherst, MA, USA - 09/2014 - current.

Toyota Technological Institute at Chicago, Research Assistant Professor
Chicago, IL, USA - 01/2012 - 08/2014.

University of Oxford, Visiting Researcher
Oxford, UK (Hosts: Prof. Andrew Zissserman and Prof. Andrea Vedaldi), Oct - Nov 2013

Center of Language and Speech Processing, Senior Member
Johns Hopkins University, USA, June - Aug 2012

University of California at Berkeley, Graduate Student Researcher
Berkeley, CA, USA, 2006 – 2011

Google Inc., Summer Intern
Image Search Group, Mountain View, CA, USA, May - July 2008 (Host: Chuck Rosenberg)

Microsoft Research India, Visiting Researcher
Bangalore, India, May - June 2010

LEAR group, INRIA Rhone Alpes, Summer Intern
Grenoble, France, May - July 2005 (Host: Cordelia Schmid)

Awards and fellowships

2015	Best poster runner-up, Scene Understanding Workshop (SUNw), CVPR 2015
2015	Outstanding reviewer, CVPR 2015
2015	Best paper award, WACV 2015
2015	Outstanding reviewer, CVPR 2014
2013	Best poster runner-up, Fine-Grained Visual Recognition Workshop, CVPR
2009-10	Google Graduate Fellowship
2010	Honorable mention, PASCAL VOC Segmentation Challenge
2009	PAMI-TC student travel for ICCV 2009
2009	Best Paper Award, International Conference on Information Fusion (ICIF)
2006-07	Department Fellowship, University of California at Berkeley
2006	Medal for graduating with the highest GPA in the CS Department, IIT Kanpur
2002-06	Pratibha scholarship from Andhra Pradesh Govt., India
2005	Rajaraman scholarship for academic proficiency, IIT Kanpur
2002-04	Academic excellence award, IIT Kanpur, 2002, 2003, 2004

Funding

1. National Science Foundation (IIS) "Rich Language-Based Understanding of Textures for Recognition and Synthesis", Award Number: 1617917 (2016 – 2019), Role: PI
2. Gift from Facebook research (2016)
3. Received GPUs via NVIDIA Academic Hardware Donation Program, 2015
4. Received GPUs via NVIDIA Academic Hardware Donation Program, 2013

Professional activities

Tutorials and workshops co-organizing

Founder and co-organizer of "New England Vision Meeting", 2015 (75+ attendees from various universities in the New England area: http://people.cs.umass.edu/~smaji/nevm2015)

Workshop on "Fine Grained Visual Classification", CVPR 2015

Workshop on "Computer Vision and Human Computation", CVPR 2014

Workshop on "Fine-grained Recognition Challenge", run in parallel with ILSVRC, ICCV 2013

Workshop at the CLSP center, Johns Hopkins university on: *Towards a Detailed Understanding of Objects and Scenes in Natural Images*, June 11 - August 7, 2012.
In collaboration with Andrea Vedaldi, Esa Rahtu, Matthew Blaschko, Iasonas Kokkinos, and Ben Taskar.
http://www.clsp.jhu.edu/workshops/archive/ws-12/groups/tduosn

Tutorial on "Computational Visual Recognition" at ICVGIP 2012, IIT Bombay
http://www.cse.iitb.ac.in/graphics/icvgip2012/tutorials.php

Tutorial on "Additive Kernels and Explicit Embeddings for Large-Scale Computer Vision Problems", ECCV 2012, Florence, Italy

Reviewing and program committee member

Area and tutorial chair, International Conference on Computer Vision, Graphics and Image Processing, 2016

Panelist, National Science Foundation (IIS), 2016

Panelist, National Science Foundation (NRI), 2016

Area chair, IEEE Computer Vision and Pattern Recognition (CVPR), 2016

Area chair, International Conference on Computer Vision, Graphics and Image Processing, 2014

Reviewer for the following international conferences:

IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2009 – 2015

European Conference on Computer Vision (ECCV) 2010, 2012, International Conference on Computer Vision (ICCV) 2009, 2011, 2013, 2015

Conference on Neural Information Processing Systems (NIPS) 2010 – 16,

Association for the Advancement of Artificial Intelligence (AAAI) 2012,

International Conference on Machine Learning (ICML) 2012, 2013

Reviewer for the following international journals:

IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI) International Journal of Computer Vision (IJCV)

Computer Vision and Image Understanding (CVIU)

IEEE Transactions on Image Processing (IP)

I have also been in the program committee member for various workshops organized at conferences including ECCV, CVPR and ICCV in the past several years.

Publications

Journals

1. **Deep Filter Banks for Texture Recognition, Description, and Segmentation**
   Mircea Cimpoi, Subhransu Maji, Iasonas Kokkinos, Andrea Vedaldi
   International Journal of Computer Vision, First online, January 09 2016

2. **Part and Attribute Discovery from Relative Annotations**
   Subhransu Maji and Gregory Shakhnarovich
   International Journal of Computer Vision, May 2014, Volume 108, Issue 1-2, pp 82-96

3. **Efficient Classification for Additive Kernel SVMs**
   Subhransu Maji, Alexander C. Berg and Jitendra Malik
   IEEE Transactions of Pattern Analysis and Machine Intelligence (PAMI), Volume 35 Issue 1, Jan 2013

4. **Poselets: A Distributed Representation for Visual Recognition**
   Lubomir Bourdev, Subhransu Maji and Jitendra Malik
   Journal of Vision, September, 23, 2011 vol. 11 no. 11 article 891

Refereed conferences

1. **Visualizing and Understanding Deep Texture Representations**
   Tsung-Yu Lin, Subhransu Maji
   CVPR 2016, Las Vegas, NV, USA
   Publication date: To appear on June 26, 2016 (Acceptance rate 29.9%)

2. **One-to-many Face Recognition with Bilinear CNNs**
   Aruni RoyChowdhury, Tsung-Yu Lin, Subhransu Maji, Erik Learned-Miller
   WACV 2016, Lake Placid, NY, USA
   Publication date: March 7, 2016 (Acceptance rate 34%)

3. **Bilinear CNN Models For Fine-grained Visual Recognition**
   Tsung-Yu Lin, Aruni RoyChowdhury, Subhransu Maji
   ICCV 2015, Santiago, Chile (oral presentation)
   Publication date: December 13, 2015 (Acceptance rate 30.3%; Oral 3.3%)
4. **Bilinear CNN Models For Fine-grained Visual Recognition**
   Tsung-Yu Lin, Aruni RoyChowdhury, Subhransu Maji
   ICCV 2015, Santiago, Chile (oral presentation)
   Publication date: December 13, 2015 (Acceptance rate 30.3%; Oral 3.3%)
5. **Multi-view CNNs for 3D Shape Recognition**
   Hang Su, Subhransu Maji, Evangelos Kalogerakis, Erik Learned-Miller
   ICCV 2015, Santiago, Chile
   Publication date: December 13, 2015 (Acceptance rate 30.3%)
6. **Deep Filter Banks for Texture Recognition and Segmentation**
   Mircea Cimpoi, Subhransu Maji, and Andrea Vedaldi
   CVPR 2015, Boston (oral presentation)
   Publication date: June 8, 2015 (Acceptance rate 28.4%; Oral 3.3%)
7. **Learning Localized Perceptual Similarities for Interactive Categorization**
   Catherine Wah, Subhransu Maji, and Serge Belongie
   WACV 2015, Waikoloa Beach, HI (best paper award)
   Publication date: January 6, 2015 (Acceptance rate 36.7%)
8. **Knowing a Good HOG Filter when You See it: Efficient Selection of Filters for Detection**
   Ejaz Ahmed, Gregory Shakhnarovich, and Subhransu Maji
   ECCV 2014, Zurich, Switzerland (oral presentation)
   Publication date: September 6, 2014 (Acceptance rate 26.7%; Oral 2.8%)
9. **Parsing World's Skylines with Shape Constrained MRFs**
   Rashmi V. Tonge, Subhransu Maji, and C.V. Jawahar
   CVPR 2014, Columbus, Ohio, USA
10. **Similarity Comparisons for Interactive Fine-Grained Categorization**
    Catherine Wah, Grant Van Horn, Steven Branson, Subhransu Maji, Pietro Perona, and Serge Belongie
    CVPR 2014, Columbus, Ohio, USA
11. **Understanding Objects in Detail with Fine-grained Attributes**
    A. Vedaldi, S. Mahendran, S. Tsogkas, S. Maji, B. Girshick, J. Kannala, E. Rahtu, I. Kokkinos, M. B. Blaschko, D. Weiss, B. Taskar, K. Simonyan, N. Saphra, and S. Mohamed
    CVPR 2014, Columbus, Ohio, USA
12. **Describing Textures in the Wild**
    Mircea Cimpoi, Subhransu Maji, Iasonas Kokkinos, Sammy Mohamed, and Andrea Vedaldi
    CVPR 2014, Columbus, Ohio, USA
13. **Active Boundary Annotation using Random MAP Perturbations**
    Subhransu Maji, Tamir Hazan and Tommi Jaakkola
    AISTATS 2014, Reykjavik, Iceland
14. **Learning Efficient Random MAP Predictors with Non-Decomposable Loss Functions**
    Tamir Hazan, Subhransu Maji, Joseph Keshet and Tommi Jaakkola
    NIPS 2013, Lake Tahoe, Nevada, USA
15. **On Sampling from the Gibbs Distribution with Random MAP Perturbations**
    Tamir Hazan, Subhransu Maji and Tommi Jaakkola
    NIPS 2013, Lake Tahoe, Nevada, USA

16. **Part Discovery from Partial Correspondence**
    Subhransu Maji and Gregory Shakhanarovich
    CVPR 2013, Portland, Oregon, USA
17. **Describing People: A Poselet-Based Approach to Attribute Classification**
    Lubomir Bourdev, Subhransu Maji and Jitendra Malik
    ICCV 2011, Barcelona, Spain (oral presentation)
18. **Semantic Contours from Inverse Detectors**
    Bharath Hariharan, Pablo Arbelaez, Lubomir Bourdev, Subhransu Maji and Jitendra Malik
    ICCV 2011, Barcelona, Spain
19. **Action Recognition from a Distributed Representation of Pose and Appearance**
    Subhransu Maji, Lubomir Bourdev and Jitendra Malik
    CVPR 2011, Colorado Springs, Colorado, USA
20. **Biased Normalized Cuts**
    Subhransu Maji, Nisheeth Vishnoi and Jitendra Malik
    CVPR 2011, Colorado Springs, Colorado, USA
21. **Object Segmentation by Alignment of Poselet Activations to Image Contours**
    Thomas Brox, Lubomir Bourdev, Subhransu Maji and Jitendra Malik
    CVPR 2011, Colorado Springs, Colorado, USA
22. **Detecting People Using Mutually Consistent Poselet Activations**
    Lubomir Bourdev, Subhransu Maji, Thomas Brox and Jitendra Malik
    ECCV 2010, Crete, Greece
23. **Max-Margin Additive Classifiers for Detection**,
    Subhransu Maji and Alexander C. Berg
    ICCV 2009, Kyoto, Japan (oral presentation)
24. **Object Detection Using a Max-Margin Hough Transform**
    Subhransu Maji and Jitendra Malik
    CVPR 2009, Miami, Florida, USA (oral presentation)
25. **Multiple-View Object Recognition in Band-Limited Distributed Camera Networks**
    Allen Y. Yang, Subhransu Maji, C. M. Christoudias, Trevor Darrell, Jitendra Malik and S. S. Sastry
    ICDSC 2009, Komo, Italy (oral presentation)
26. **Distributed Compression & Fusion of Nonnegative Sparse Signals for Multiple-View Object Recognition**
    Allen Y. Yang, Subhransu Maji, K. Hong, P. Yan, Shankar S. Sastry
    ICIF 2009, Seattle, Washington, USA (best paper award)
27. **Classification using Intersection Kernel SVMs is Efficient**
    Subhransu Maji, Alexander C. Berg and Jitendra Malik
    CVPR 2009, Anchorage, Alaska, USA
28. **Confidence Based updation of Motion Conspicuity in Dynamic Scenes**
    Vivek Kumar Singh, Subhransu Maji and Amitabha Mukerjee
    Computer and Robot Vision (CRV) 2006, Québec City, Canada

Workshops

1. **Jointly Learning Multiple Perceptual Similarities**
   Liwen Zhang, Subhransu Maji, and Ryota Tomioka
   Multi-View Representation Learning Workshop (MVRL) at ICML, 2016

2. **Distinguishing Weather Phenomena from Bird Migration Patterns in Radar Imagery**
   Aruni RoyChowdhury, Daniel Sheldon, Subhransu Maji, Erik Learned-Miller
   IEEE Worksop on Perception Beyond the Visual Spectrum (PBVS), 2016

3. **Visualizing Deep Texture Representations**
   Tsung-Yu Lin, Subhransu Maji
   Workshop on Visualization for Deep Learning at ICML, 2016

4. **Learning Localized Perceptual Similarity Metrics for Interactive Categorization**
   Catherine Wah, Subhransu Maji, and Serge Belongie
   Human-Machine Communication for Visual Recognition and Search, ECCV 2014
   This is the extended abstract version of the WACV 2015 paper

5. **Using Human Knowledge to Judge Part Goodness: Interactive Part Selection**
   Ejaz Ahmed, Subhransu Maji, Gregory Shakhnarovich, Larry Davis
   Workshop on Computer Vision and Human Computation, CVPR 2014

6. **Discovering a Lexicon of Parts and Attributes**
   Subhransu Maji
   Second International Workshop on Parts and Attributes, ECCV 2012 (oral presentation)
   Best poster runner-up at Fine-Grained Visual Recognition Workshop, CVPR 2013

7. **Linearized Smooth Additive Classifiers**
   Subhransu Maji, Workshop on Web-scale Vision and Social Media, ECCV 2012 (oral presentation)

8. **Part Annotations via Pairwise Correspondence**
   Subhransu Maji and Gregory Shakhanarovich
   4th Workshop on Human Computation, AAAI 2012 (oral presentation)

9. **Fast Unsupervised Alignment of Video and Text for Indexing/Names and Faces**
   Subhransu Maji and Ruzena Bajscy
   Multimedia Semantics Workshop, ACM Multimedia 2007, Augsburg, Germany

Technical reports and preprints (non peer-reviewed)

1. **Fine-Grained Visual Classification of Aircraft**
   Subhransu Maji, Esa Rahtu, Juho Kannala, Matthew Blaschko and Andrea Vedaldi
   CoRR arXiv:1306.5151, Submitted 21 Jun 2013.
   This dataset will be a part of the Fine-Grained Visual Recognition Challenge, run in parallel with ImageNet classification challenge, ILSVRC 2013

2. **Large Scale Image Annotations on Amazon Mechanical Turk**
   Subhransu Maji, EECS Department, UCB, Tech. Rep. UCB/EECS-2011 – 79, July 2011

3. **Fast and Accurate Digit Classification**
   Subhransu Maji and Jitendra Malik
   EECS Department, UCB, Tech. Rep. UCB/EECS-2009 – 159, Nov. 2009

Book chapters

1. **A Taxonomy of Part and Attribute Discovery Techniques**
   Subhransu Maji
   Visual Attributes, Springer, 2016, D. Parikh, R. Feris and C. Lampert, Eds.

2. **Perturbation Models and PAC-Bayesian Generalization Bounds**
   J. Keshet, S. Maji, T. Hazan, and T. Jaakkola
   Perturbations, Optimization, and Statistics, MIT Press, 2016, T. Hazan, G. Papandreou, and D. Tarlow, Eds.

3. **Multiple-view Object Recognition in Smart Camera Networks**
   Allen Y. Yang, Subhransu Maji, M. C. Christoudias, Trevor Darrell, Jitendra Malik, Shankar S. Sastry Distributed Video Sensor Networks, Springer, 2010

Open-source software

1. Visualizing deep texture representations
   https://bitbucket.org/tsungyu/deep-texture
2. Bilinear CNNs for fine-grained recognition
   https://bitbucket.org/tsungyu/bcnn
3. Multi-view CNNs for 3D shape recognition
   https://github.com/suhangpro/mvcnn
4. Deep filter-banks for texture recognition
   https://github.com/mcimpoi/deep-fbanks
5. **FIKSVM**: Fast intersection kernel SVM library
   http://people.cs.umass.edu/~smaji/projects/fiksvm
6. Code for parsing skyline images
   https://github.com/msubhransu/skylineParsing
7. Software of pose estimation and action recognition from images using poselets
   http://people.cs.umass.edu/~smaji/projects/{action,3dpose}
8. A library written in C++/MATLAB to detect pedestrians in images
   http://people.cs.umass.edu/~smaji/projects/ped-detector
9. **LIBSPLINE**: A library for training additive classifiers efficiently
   https://github.com/msubhransu/libspline
10. Software for interactive segmentation using normalized cuts
    http://people.cs.umass.edu/~smaji/projects/biasedNcuts
11. Software for collecting annotations on Amazon's Mechanical Turk
    http://people.cs.umass.edu/~smaji/projects/projects/mturk

Publicly available datasets and benchmarks

Can be downloaded from: http://people.cs.umass.edu/~smaji/data.html

1. **Skyline10** dataset containing 100 high resolution annotated city skyline images, CVPR 2014
2. **OID:Aircraft** images labelled with detailed attributes (8000+ images), CVPR 2014
3. **FGVC:Aircraft** A fine-grained dataset of aircraft variants
4. **Describable texture dataset** (5000+ images with 47 attributes), CVPR 2014
5. **Keypoint annotations** of all the objects (20,000+) in the PASCAL VOC 2012 dataset
6. **Semantic boundary dataset** consisting of object boundaries on 11,000+ images

Student supervision

Advisees

JongChyi Su, PhD student, UMass Amherst (*current*)

TsungYu Lin, PhD student, UMass Amherst (*current*)

Hang Su, PhD student, UMass Amherst (*current*, Co-supervised w/ E. Learned-Miller, E. Kalogerakis)

Huaizu Jiang, PhD student, UMass Amherst (*current*, Co-supervised w/ E. Learned-Miller)

Aruni RoyChowdhury, PhD student, UMass Amherst (*current*, Co-supervised w/ E. Learned-Miller)

Thomas Irmer (MS student at Ruhr-Universitt Bochum, co-advised with Tobias Glasmachers)

Interns and student collaborators

Brayden Neal, undergraduate student (REU program), UPenn, Summer 2016 (*current*)

Liwen Zhang, PhD student at University of Chicago (Co-supervised with Ryota Tomioka) (*current*)

Mikayla Trimm, undergraduate student (REU program), UCF, Summer 2015

Kundan Kumar, undergraduate student, IIT Kanpur, Summer 2015

Mircea Cimpoi, PhD student at Oxford University (Co-supervised w/ Andrea Vedaldi), 2013-2015

Ejaz Ahmed, PhD student at UMD (Intern w/ Greg Shakhnarovich), summer 2014

Catherine Wah, PhD student at UCSD, Intern, Feb - April '13, Jan - April '14

Rashmi V. Tonge, MS student at IIIT Hyderabad (Thesis co-supervisor w/ C.V. Jawahar), 2013 - 2014

Teaching

Instructor, CMPSCI 670: Computer Vision, UMass Amherst, Fall 2016

Instructor, CMPSCI 370/370HH: Intro. to Computer Vision (w/ honors section), UMass Amherst, Spring 2015

Instructor, CMPSCI 679: Machine Learning, UMass Amherst, Spring 2015

Instructor, CMPSCI 670: Computer Vision, UMass Amherst, Fall 2014

Guest lecturer, Visual Recognition , TTI Chicago, Winter 2012

Guest lecturer, CS 294: Visual Search Engines, UC Berkeley, Fall 2010

Guest lecturer, CS 280: Computer Vision, UC Berkeley, Spring 2010

GSI for CS 162, Operating Systems and Systems Programming, UC Berkeley, Fall 2006

Organized and taught 'Data Structures and Algorithms', IIT Kanpur, Summer 2006

Invited talks, presentations, etc.

Cross quality distillation (or "How to see Blurry pictures better"), Google Research, *Cambridge, MA* (June 2016)

Invited talk, CVPR16 Area Chair Workshop, *Vancouver* (Feb 2016)

Bilinear CNN models for fine-grained visual recognition

- Computer vision seminar, *Boston University* (March 2016)
- Computer vision seminar, *University of Washington* (Oct 2015)

Microsoft Research, *Seattle* (Oct 2015)
Computer vision seminar, *UC Berkeley* (Sept 2015)
Google research, *Mountain view* (Sept 2015)
Computer vision seminar, *MIT* (May 2015)

Invited talk, ImageNet workshop at ICCV15, *Santiago* (Dec 2015)

The world of computer vision, Science Quest, *UMass Amherst* (Oct 2015)

But what is it made of? ("Learning to recognize materials"), Faculty research seminar, UMass Amherst (Dec 2014)

Rich semantic representations for detailed visual recognition

Invited talk, *Toyota Technological Institute at Chicago* (April 2014)
Invited talk, *University of Minnesota, Twin-Cities* (March 2014)
Invited talk, *Imperial College London* (March 2014)
Invited talk, *Microsoft research, Cambridge, UK* (March 2014)
Invited talk, *Adobe Research, San Francisco* (March 2014)
Invited talk, *University of North Carolina, Chapel Hill* (March 2013)
Invited talk, *University of Southern California* (March 2013)
Invited talk, *University of Maryland, College Park* (March 2013)
Invited talk, *University of California, Berkeley* (March 2013)
Invited talk, *University of Massachusetts, Amherst* (Feb 2014)

Discovering the structure of visual categories

Robotics seminar, *Oxford University* (Sept 2013)
Invited talk, *Microsoft research, Cambridge, UK* (Sept 2013)
Machine learning and friends seminar, *UMass, Amherst* (Oct 2013)
Invited talk, *Kyoto university* (May 2013)
Faculty research seminar, *Toyota Technological Institute, Chicago* (2013)

Discovering a lexicon of parts and attributes

CLSP Summer Workshop, *Johns Hopkins University* (2012)
Midwest vision workshop, *UIUC* (2012)
Keynote talk, Workshop on Parts and Attributes, ECCV *Florence* (2012)
Computer vision seminar, Caltech (2012)

Linearized Smooth Additive Classifiers, Workshop on Web-scale Vision and Social Media, ECCV, *Florence* (2012)

Fast and accurate object and action detection

Computer vision seminar, MIT (2011)
Robotics institute seminar, CMU (2011)
Invited talk, Google research, *Mountain view* (2011)
Vision workshop, *Mysore park* (2011)

Large-scale image annotations using Amazon mechanical turk

Intel research, *Berkeley* (2011)
RAD LAB seminar, *Berkeley* (2011)
Machine learning tea, *Berkeley* (2011)