

Adarsh P. Kowdle

7001 Old Redmond Rd, Apt J238, Redmond, WA-98052 ♦ adkowdle@microsoft.com ♦ Cell Phone: 412.298.5042
<http://chenlab.ece.cornell.edu/people/adarsh/>

EDUCATION

CORNELL UNIVERSITY, Ithaca, NY **JANUARY 2009 – MAY 2013**

PhD Candidate, Electrical and Computer Engineering (GPA: 4.0)

Thesis: "Putting the user in the loop for image-based modeling"

Thesis committee: Tsuhan Chen (Advisor), Anthony Reeves, Noah Snavely,
Ashutosh Saxena, Richard Szeliski

Interests: Computer vision, machine learning

Focus: Interactive computer vision algorithms, Image-based modeling

RV COLLEGE OF ENGINEERING, Bangalore, India **JULY 2004 – MAY 2007**

B.E. Electronics and Communication Engineering (First Class with Distinction: 86%)

RESEARCH OVERVIEW

My research broadly falls into three categories,

- **Image-based modeling:** The task of image-based modeling refers to recovering 3D structure from 2D images. My work in this space predominantly revolves around putting the user in the loop with the algorithm in a discrete labeling framework. In one approach, the user initiates the algorithm by indicating the object of interest via scribbles that helps obtain the 3D model of the object of interest [ECCV '10, ICIP '11]. We have successfully extended this to an iOS application to achieve this task on a mobile device [Demo at CVPR '12]. In an alternate approach, I have explored an active learning framework where the algorithm initiates the process of 3D modeling and guides the user towards providing support cues to improve the 3D model [CVPR '11]. In extensions of image-based modeling to videos, I have proposed an algorithm to temporally segment a video to clips of four classes – static vs. dynamic camera and static vs. dynamic scene revealing interesting trends in Hollywood movies across time [ECCV '12]. Using this segmentation as a pre-processing step, I have explored estimating the depth of the scene in hard scenarios where the scene has a dynamic object [ICIP '12, CVPR '13].
- **Object co-segmentation:** Segmenting out the common foreground object from a group of images is the task of co-segmentation. In initial work, we explored the task of interactive co-segmentation where the user provides cues to the algorithm indicating the foreground. We explored the importance of the user choosing the right image to provide interactions [ICIP '09], how can interactive segmentation help perform better image retrieval [CVPR '09], and how the algorithm can actively guide the user to provide useful cues [CVPR '10, IJCV '11, SpringerBriefs '11]. This can be extended to multiview co-segmentation [ECCV '10]. In addition, I have proposed an unsupervised algorithm to achieve the task using stereo and appearance cues [ECCV '12].
- **Holistic scene understanding:** We refer to the task of recovering various high level cues given an image, such as scene recognition, depth estimation, object detection, etc. as holistic scene understanding. In this domain we have proposed a new model called Feedback Enabled Cascaded Classifier Models (FECCM) to combine information from these different vision tasks into one framework to aide each other [TPAMI '12, NIPS '10, ECCV '10].

Some of my other research activities include advising masters and undergraduate students towards their respective theses. A list of these projects are given below under mentored projects.

PROFESSIONAL EXPERIENCE

MICROSOFT RESEARCH, Redmond, WA **MAY 2011 – AUGUST 2011**

- *Research Intern*, Interactive Visual Media Group
- *Mentors:* Sudipta Sinha, Richard Szeliski
- Multiple View Object Cosegmentation using Appearance and Stereo Cues

KODAK RESEARCH LABS, Rochester, NY **MAY 2010 – AUGUST 2010**

- *Research Intern*, 3D Team
- *Mentor:* Andrew Gallagher
- Combining Monocular Geometric Cues with Traditional Stereo Cues for Consumer Camera Stereo

Adarsh P. Kowdle

7001 Old Redmond Rd, Apt J238, Redmond, WA-98052 ♦ adkowdle@microsoft.com ♦ Cell Phone: 412.298.5042
<http://chenlab.ece.cornell.edu/people/adarsh/>

PUBLICATIONS

ITTIAM SYSTEMS, Bangalore, India

JULY 2007 – JULY 2008

- *Engineer*, Video Technology: QoS Team
- Improved the performance of Ittiam's H.264 encoder. Re-implemented the entire Intra frame path and intra-coding mode decisions on C64x platform, achieving improved performance through low-complexity mode selection algorithms for Ittiam's H.264 encoder

ITTIAM SYSTEMS, Bangalore, India

JAN 2007 – MAY 2007

- *Intern*, Video Technology: QoS Team.
- *Mentor*: Sarat Chandra Vadapalli
- Developed a test-bench using PERL, for automating the encoder regression runs to evaluate the Rate-Distortion (RD) performance

BOOKS

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

JOURNAL PAPERS

- **Adarsh Kowdle**, Yao-Jen Chang, Andrew Gallagher, Dhruv Batra and Tsuhan Chen. "*Putting the User in the Loop for Image-Based Modeling*", International Journal of Computer Vision (IJCV), 2014
- Congcong Li, **Adarsh Kowdle**, Ashutosh Saxena and Tsuhan Chen. "*Towards Holistic Scene Understanding: Feedback Enabled Cascaded Classification Models*", IEEE Transactions on Pattern Recognition and Machine Intelligence (TPAMI), 2012
- Dhruv Batra, **Adarsh Kowdle**, Devi Parikh, Jiebo Luo and Tsuhan Chen. "*Interactively Co-segmenting Topically Related Images with Intelligent Scribble Guidance*", International Journal of Computer Vision (IJCV), 2011

CONFERENCE AND WORKSHOP PAPERS

- Aayush Bansal, **Adarsh Kowdle**, Devi Parikh, Andrew Gallagher and Larry Zitnick. "*Which edges matter?*", Workshop on 3D Representation and Recognition, International Conference on Computer Vision (3DRR-ICCV), 2013
- **Adarsh Kowdle**, Andrew Gallagher and Tsuhan Chen. "*Revisiting depth layers from occlusions*", Computer Vision and Pattern Recognition (CVPR), 2013
- **Adarsh Kowdle** and Tsuhan Chen. "*Learning to Segment a Video to Clips Based on Scene and Camera Motion*", European Conference on Computer Vision (ECCV), 2012
- **Adarsh Kowdle**, Sudipta Sinha and Richard Szeliski. "*Multiple View Object Cosegmentation using Appearance and Stereo Cues*", European Conference on Computer Vision (ECCV), 2012 (**Oral presentation**)
- **Adarsh Kowdle**, Andrew Gallagher and Tsuhan Chen. "*Combining Monocular Geometric Cues with Traditional Stereo Cues for Consumer Camera Stereo*", Workshop on Unsolved Problems in Optical Flow and Stereo Estimation, European Conference on Computer Vision (ECCV), 2012
- **Adarsh Kowdle**, Noah Snavely and Tsuhan Chen. "*Recovering Depth of a Dynamic Scene using Real World Motion Prior*", IEEE International Conference on Image Processing (ICIP), 2012 (**Oral presentation – Best Student Paper Award**)
- **Adarsh Kowdle**, Yao-Jen Chang, Andrew Gallagher and Tsuhan Chen. "*Active Learning for Piecewise Planar 3D Reconstruction*", Computer Vision and Pattern Recognition (CVPR), 2011 (**Oral presentation**)
- **Adarsh Kowdle**, Yao-Jen Chang, Dhruv Batra and Tsuhan Chen. "*Scribble Based Interactive 3D Reconstruction via Scene Co-segmentation*", International Conference on Image Processing (ICIP), 2011 (**Oral presentation**).
- Congcong Li, **Adarsh Kowdle**, Ashutosh Saxena and Tsuhan Chen. "*Feedback Enabled Cascaded Classification Models for Scene Understanding*", Neural Information Processing Systems (NIPS), 2010
- **Adarsh Kowdle**, Dhruv Batra, Wen-Chao Chen and 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 (ECCV), 2010

Adarsh P. Kowdle

7001 Old Redmond Rd, Apt J238, Redmond, WA-98052 ♦ adkowdle@microsoft.com ♦ Cell Phone: 412.298.5042
<http://chenlab.ece.cornell.edu/people/adarsh/>

- **Adarsh Kowdle***, Congcong Li*, Ashutosh Saxena and Tsuhan Chen. "A generic model to compose vision modules for holistic scene understanding", Workshop on Parts and Attributes, European Conference on Computer Vision (ECCV), 2010. [*indicates equal contribution].
- **Adarsh Kowdle**, Kuo-Wei Chang, and Tsuhan Chen. "Video Categorization using Object of Interest Detection", International Conference on Image Processing (ICIP), 2010
- Dhruv Batra, **Adarsh Kowdle**, Devi Parikh, Jiebo Luo and Tsuhan Chen. "iCoseg: Interactive Co-segmentation with Intelligent Scribble Guidance", Computer Vision and Pattern Recognition (CVPR), 2010
- Dhruv Batra, **Adarsh Kowdle**, Devi Parikh and Tsuhan Chen. "Cutout Search: Putting a Name to the Picture". IEEE workshop on Internet Vision (CVPR), 2009.
- Dhruv Batra, Devi Parikh, **Adarsh Kowdle**, Tsuhan Chen and Jiebo Luo. "Seed Image Selection in Interactive Cosegmentation", IEEE International Conference on Image Processing (ICIP), 2009

TECHNICAL REPORTS

- Adarsh Kowdle, Zhaoyin Jia. "Online Structured Learning for Obstacle Avoidance". Spring 2010
- Adarsh Kowdle and Kamil Bojanczyk. "Brain MRI Classification using Expectation Maximization". Spring 2009
- Adarsh Kowdle. "Parallel Implementation of RANSAC using OpenMP". Spring 2009
- Adarsh Kowdle, Yao-Jen Chang and Tsuhan Chen. "Structure and Motion Recovery using Visual SLAM". Fall 2008
- Adarsh Kowdle, Mukta Gore and Utsav Prabhu. "Background Subtraction and Foreground Classification for Outdoor Video Surveillance". Fall 2008
- Adarsh Kowdle, Deepak A. R, Diwakar. R and Karthik. R. "Implementation of a Voice-Based Biometric System", Undergraduate Thesis, Fall 2007

DEMOS

- **Adarsh Kowdle**, Haochen Liu, ShaoYou Hsu, Jason Lew, Charvi Puri, Dhruv Batra, Tsuhan Chen. "iModel: Object of Interest 3D Modeling via Interactive Co-segmentation on a Mobile Device". Demo session at Computer Vision and Pattern Recognition (CVPR) 2012
- Dhruv Batra, **Adarsh Kowdle**, Kevin Tang, Devi Parikh, Jiebo Luo and Tsuhan Chen. "Interactive Cosegmentation by Touch". Demo session at Computer Vision and Pattern Recognition (CVPR) 2009

MENTORED PROJECTS

- Zhouchi Lin. "Campus Location Recognition and Room Recommendation System on a Mobile Device". MEng Project, 2013
- Ran Hu. "iGuide: Capturing the Right Image with Active 3D User Guidance on a Mobile Device". MEng Project, 2013
- Shuai Yuan. "Image Based Room Schedule Retrieval System". MEng Project, 2012
- ShaoYou Hsu and Haochen Liu. "iModel: Object of Interest 3D Modeling on a Mobile Device". MEng Project, 2012
- Sukhada Pendse and Xiaochen He. "Sketch2Image Search". MEng Project, 2012
- Ling-Wei Lee. "2D to 3D Video Conversion for Static Scenes and Horizontal Camera Translation". MEng Project, 2011 (Co-advised by Yao-Jen Chang)
- Anandram Sundar. "3D Interface for Google Sketchup using a Kinect Sensor". MEng Project, 2011
- Jason Lew. "iOS Application to Perform Interactive Cosegmentation". MEng Project, 2010
- Kevin Tang. "iScribble: A java-based tool to accept user scribbles for interactive vision applications". Undergraduate Thesis, 2009 (Co-advised by Dhruv Batra)

Adarsh P. Kowdle

7001 Old Redmond Rd, Apt J238, Redmond, WA-98052 ♦ adkowdle@microsoft.com ♦ Cell Phone: 412.298.5042
<http://chenlab.ece.cornell.edu/people/adarsh/>

PROGRAMMING EXPERIENCE

- **Programming languages: MATLAB, C/C++**
- **PDSP: TMS320C54XX, C67XX, C64X+ (DAVINCI) – USED ACTIVELY AT ITTIAM SYSTEMS**

TEACHING

- **Teaching assistant for Computer Vision (CS 6670) at Cornell University**
Instructor: Noah Snaveley **FALL 2009**

LEADERSHIP

- **Advisory council, Cornell India Association** **2012 - 2013**
- **President, Cornell India Association** **2011 - 2012**
- **Vice-President, ECE-Graduate Organization, Cornell University** **2011 - 2012**
- **President, ECE-Graduate Organization, Cornell University** **2010 - 2011**
- **Treasurer, Cornell India Association** **2010 - 2011**
- **VP Logistics, Cornell India Association** **2009 - 2010**
- **Student Secretary, RVCE IEEE Chapter** **2006 - 2007**
- **National Service Scheme** **2004 - 2007**
- **CCC-International Conference, Bangalore, India** **NOVEMBER 2006**
 - Organizing committee: International conference on **Computer, Communication & Controls**

HONORS

- **Cornell McMullen Fellowship** **2009 - Present**
- **Cognizant, Best Outstanding Student Award** (during undergraduate studies) **JULY 2007**
- **Infineon Technologies Ltd, Scholarship** **APRIL 2006**
- **International Award for Young People** **APRIL 2000**
 - Attained the **Bronze Standard** of the International award for Young people

OTHER ACTIVITIES

- **Part of the Cornell Badminton Team since 2011**
- **Passionate about music - played the keyboard and harmonica as part of several music groups during undergraduate and graduate studies**