

# XIAOFENG REN

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Google Scholar: <https://scholar.google.com/citations?user=1KFFbEIAAAAJ>  
(citations 9000, H-index 42)

## EDUCATION

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Ph.D. in Computer Science	2006	University of California, Berkeley, CA
Advisor: Prof. Jitendra Malik		
M.S. in Computer Science	2000	Stanford University, Stanford, CA
B. S. in Computer Science	1997	Zhejiang University, Hangzhou, China

## POSITIONS

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2017 – present      Chief Scientist and Deputy Dean  
Institute of Data Science and Technologies (iDST)  
Alibaba

2017 – 2017      Senior Principal Scientist  
Amazon

2013 – 2017      Principal Research Scientist and Research Manager  
Amazon Go

Developing a brand-new Amazon business with a ground-breaking computer vision product. First and lead scientist in a X00-people division; going from conception to prototyping to production algorithms. Built a world-class research team from scratch. Algorithm work covers a wide range of topics in computer vision and machine learning. Work expanding both building real-time systems and state-of-the-art deep learning technologies.

2010 – present      Affiliate Assistant Professor  
Department of Computer Science and Engineering  
University of Washington

Collaborated with UW faculty on computer vision, robotics, machine learning, human-computer interaction, ubiquitous computing, privacy,

2011 – 2013      Senior Research Scientist  
Intel Science and Technology Center for Pervasive Computing, Intel Labs

Led the Everyday Sensing Project at Intel Labs. Worked on computer vision and its applications in activity recognition and monitoring, robotics, and human-computer interaction. Co-founded two new and growing directions in computer vision: RGB-D perception, Egocentric Vision (see workshop series). State of the art on object recognition, scene understanding, object pose estimation, boundary detection. Built demos for real-time object recognition, scene understanding, 3D modeling, augmented reality, and robotic sensing.

2008 – 2011      Research Scientist  
Intel Labs Seattle

2006 – 2008      Research Assistant Professor

## **PUBLICATIONS**

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### **Refereed Publications**

- Si Lu, Xiaofeng **Ren**, Feng Liu, Depth Enhancement via Low-rank Matrix Completion. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2013.
- Xiaofeng **Ren**, Dieter Fox, and Kurt Konolige, *Change Their Perception: RGB-D for 3-D Modeling and Recognition*, in *IEEE Robotics and Automation Magazine (RAM)*, 2013.
- Xiaofeng **Ren**, Deva Ramanan. “Histograms of Sparse Codes for Object Detection”. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2013.
- Liefeng Bo, Xiaofeng **Ren**, Dieter Fox. “Multipath Sparse Coding Using Hierarchical Matching Pursuit”. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2013.
- Evan Herbst, Xiaofeng **Ren**, Dieter Fox. “RGB-D Flow: Dense 3-D Motion Estimation Combining Color and Depth”. In *International Conference on Robotics and Automation (ICRA)*, 2013.
- Xiaofeng **Ren**, Dieter Fox, Kurt Konolige. “RGB-D Perception for 3D Modeling and Recognition”. In *IEEE Magazine on Robotics and Automation (RAM)*, 2013.
- Xiaofeng **Ren** and Liefeng Bo. “Discriminatively Trained Sparse Code Gradients for Contour Detection”. In *Advances in Neural Information Processing Systems (NIPS)*, Lake Tahoe, 2012.
- Miro Enev, Jaeyeon Jung, Liefeng Bo, Xiaofeng **Ren**, Tadayoshi Khono. “SensorSift: Balancing Sensor Data Privacy and Utility in Automated Face Understanding”. In *Annual Computer Security Applications Conference (ACSAC)*, Orlando, 2012.
- Yang Chen, Xiaofeng **Ren**, Guo-Qiang Zhang, Rong Xu. “Ontology Guided Approach to Retrieving Disease Manifestation Images for Health Image Base Construction”. In *2<sup>nd</sup> Annual IEEE Healthcare Informatics, Imaging, and Systems Biology Conference (HISB)*, San Diego, 2012. (**best paper**)
- Jinna Lei, Xiaofeng **Ren** and Dieter Fox. “Fine-Grained Kitchen Activity Recognition using RGB-D”, in *International Conference on Ubiquitous Computing (Ubicomp)*, Pittsburgh, 2012.
- Liefeng Bo, Xiaofeng **Ren** and Dieter Fox. “Unsupervised Feature Learning for RGB-D Based Object Recognition”, in *International Symposium on Experimental Robotics (ISER)*, Quebec, 2012.
- Xiaofeng **Ren**, Liefeng Bo, Dieter Fox. “RGB-(D) Scene Labeling: Features and Algorithms”, in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Providence, 2012.
- Kevin Lai, Liefeng Bo, Xiaofeng **Ren**, Dieter Fox. “Detection-based Object Labeling in 3D Scenes”, in *International Conference on Robotics and Automation (ICRA)*, Saint Paul, 2012.
- Peter Henry, Michael Krainin, Evan Herbst, Xiaofeng **Ren** and Dieter Fox. “RGB-D Mapping: Using Kinect-Style Depth Cameras for Dense 3D Modeling of Indoor Environments”, in *International Journal of Robotics Research (IJRR)*, 2012.
- Liefeng Bo, Xiaofeng **Ren** and Dieter Fox. “Hierarchical Matching Pursuit for Image Classification: Architecture and Fast Algorithms”, in *Advances in Neural Information Processing Systems (NIPS)*, Granada, 2011.
- Diane Hu, Liefeng Bo, Xiaofeng **Ren**. “Toward Robust Material Recognition for Everyday Objects”, in *British Machine Vision Conference (BMVC)*, Dundee, 2011.

- Alireza Fathi, Maria F. Balcan, Xiaofeng **Ren**, James Rehg. “Combining Self Training and Active Learning for Video Segmentation”, in *British Machine Vision Conference (BMVC)*, Dundee, 2011.
- Liefeng Bo, Xiaofeng **Ren** and Dieter Fox. “Depth Kernel Descriptors for Object Recognition”, in *International Conference on Intelligent Robots and Systems (IROS)*, San Francisco, 2011.
- Evan Herbst, Xiaofeng **Ren**, Dieter Fox, “RGB-D Object Discovery via Multi-Scene Analysis”, in *International Conference on Intelligent Robots and Systems (IROS)*, San Francisco, 2011.
- Hao Du, Peter Henry, Xiaofeng **Ren**, Marvin Cheng, Daniel Goldman, Steve Seitz, Dieter Fox. “Interactive 3D Modeling of Indoor Environments with a Consumer Depth Camera”, in *International Conference on Ubiquitous Computing (UbiComp)*, Beijing, 2011.
- Kevin Lai, Liefeng Bo, Xiaofeng **Ren** and Dieter Fox. “A Scalable Tree-based Approach for Joint Object and Pose Recognition”, in *AAAI Conference on Artificial Intelligence (AAAI)*, San Francisco, 2011.
- Liefeng Bo, Kevin Lai, Xiaofeng **Ren** and Dieter Fox. “Object Recognition with Hierarchical Kernel Descriptor”, in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Colorado Springs, 2011.
- Alireza Fathi, Xiaofeng **Ren** and James Rehg. “Learning to Recognize Objects in Egocentric Activities”, in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Colorado Springs, 2011.
- Michael Krainin, Peter Henry, Xiaofeng **Ren**, Dieter Fox. “Manipulator and Object Tracking for In Hand Model Acquisition”, in *International Journal of Robotics Research (IJRR)*, 2011.
- Kevin Lai, Liefeng Bo, Xiaofeng **Ren**, Dieter Fox. “A Large-Scale Hierarchical Multi-View RGB-D Object Dataset”, in *International Conference on Robotics and Automation (ICRA)*, Shanghai, 2011.
- Kevin Lai, Liefeng Bo, Xiaofeng **Ren**, Dieter Fox. “Sparse Distance Learning for Object Recognition Combining RGB and Depth Information”, in *International Conference on Robotics and Automation (ICRA)*, Shanghai, 2011. (**best paper**)
- Evan Herbst, Xiaofeng **Ren**, Dieter Fox, “Toward Object Discovery and Modeling via 3-D Scene Comparison”, in *International Conference on Robotics and Automation (ICRA)*, Shanghai, 2011.
- Eric Larson, Gabe Cohn, Sidhant Gupta, Xiaofeng **Ren**, Beverly Harrison, Dieter Fox, Shwetak N. Patel. “HeatWave: Thermal Imaging for Surface User Interaction”, in *ACM Conference on Human Factors in Computing Systems (CHI)*, Vancouver, 2011. (**honorable mention**)
- Liefeng Bo, Xiaofeng **Ren** and Dieter Fox. “Kernel Descriptors for Visual Recognition”, in *Advances in Neural Information Processing Systems (NIPS)*, Vancouver, 2010.
- Peter Henry, Michael Krainin, Evan Herbst, Xiaofeng **Ren** and Dieter Fox. “RGB-D Mapping: Using Depth Cameras for Dense 3D Modeling of Indoor Environments”, in *International Symposium on Experimental Robotics (ISER)*, New Delhi, 2010.
- Chunhui Gu and Xiaofeng **Ren**. “Discriminative Mixture-of-Templates for Viewpoint Classification”, in *European Conference on Computer Vision (ECCV)*, Crete, 2010.
- Xiaofeng **Ren** and Chunhui Gu. “Figure-Ground Segmentation Improves Handled Object Recognition in Egocentric Video”, in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, San Francisco, 2010.
- Xiaofeng **Ren**. “Multi-scale improves boundary detection in natural images”, in *European Conference on Computer Vision (ECCV)*, Marseille, 2008.
- Xiaofeng **Ren**, “Finding People in Archive Films through Tracking”, in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Anchorage, 2008.
- Xiaofeng **Ren**, “Local Grouping for Optical Flow”, in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Anchorage, 2008.

- Xiaofeng **Ren**, Charless Fowlkes and Jitendra Malik, “Learning Probabilistic Models for Contour Completion in Natural Images”, *International Journal on Computer Vision (IJCV)*, 2008.
- Xiaofeng **Ren** and Jitendra Malik, “Tracking as Repeated Figure/Ground Segmentation”, in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Minneapolis, 2007.
- Xiaofeng **Ren**, “Learning and Matching Line Aspects for Articulated Objects”, in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Minneapolis, 2007.
- Xiaofeng **Ren**, Charless Fowlkes and Jitendra Malik. “Figure/Ground Assignment in Natural Images”, in *European Conference on Computer Vision (ECCV)*, Graz, 2006.
- Xiaofeng **Ren**, Charless Fowlkes and Jitendra Malik. “Cue Integration in Figure/Ground Labeling”, in *Advances in Neural Information Processing Systems (NIPS)*, Vancouver, 2005.
- Xiaofeng **Ren**, Alexander Berg and Jitendra Malik. “Recovering Human Body Configurations using Pairwise Constraints between Parts”, in *IEEE International Conference on Computer Vision (ICCV)*, Beijing, 2005.
- Xiaofeng **Ren**, Charless Fowlkes and Jitendra Malik. “Scale-Invariant Contour Completion using Conditional Random Fields”, in *IEEE International Conference on Computer Vision (ICCV)*, Beijing, 2005.
- Gregory Mori, Xiaofeng **Ren**, Alexei A. Efros and Jitendra Malik. “Recovering Human Body Configurations: Combining Segmentation and Recognition”, in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Washington, DC, 2004.
- Xiaofeng **Ren** and Jitendra Malik. “Learning a Classification Model for Segmentation”, in *IEEE International Conference on Computer Vision (ICCV)*, Nice, 2003.
- Xiaofeng **Ren** and Jitendra Malik. “A Multi-Scale Model for Contour Completion based on Image Statistics”, in *European Conference on Computer Vision (ECCV)*, Copenhagen, 2002.

#### **Other Publications**

- Kevin Lai, Liefeng Bo, Xiaofeng Ren, Dieter Fox. “RGB-D Object Recognition: Features, Algorithms, and a Large Scale Benchmark”. *Consumer Depth Cameras for Computer Vision: Research Topics and Applications*, 2013.
- Liefeng Bo, Xiaofeng Ren, Dieter Fox. “Multipath Sparse Coding Using Hierarchical Matching Pursuit”. *Deep Learning Workshop, with Neural Information Processing Systems (NIPS)*, 2012.
- Evan Herbst, Xiaofeng Ren, Dieter Fox. “Object Segmentation from Motion with Dense Feature Matching”. *Workshop on Semantic Perception, Mapping, and Exploration, in conjunction with ICRA 2012*.
- Kevin Lai, Liefeng Bo, Xiaofeng Ren and Dieter Fox. “Sparse Distance Learning for Object Recognition Combining RGB and Depth Information”, in *Workshop on RGB-D: Advanced Reasoning with Depth Cameras*, in conjunction with RSS 2010.
- Peter Henry, Michael Krainin, Evan Herbst, Xiaofeng Ren and Dieter Fox. “RGB-D Mapping: Using Depth Cameras for Dense 3D Modeling of Indoor Environments”, in *Workshop on RGB-D: Advanced Reasoning with Depth Cameras*, in conjunction with RSS 2010.
- Michael Krainin, Peter Henry, Xiaofeng Ren and Dieter Fox. “Manipulator and Object Tracking for In Hand Model Acquisition”, in *Mobile Manipulation and Best Practices in Robotics Workshops*, in conjunction with ICRA 2010.
- Xiaofeng Ren and Matthai Philipose. “Egocentric Recognition of Handled Objects: Benchmark and Analysis”, in *CVPR Workshop on Egocentric Vision*, Miami, 2009.
- Xiaofeng Ren. “Multi-Scale Boundary Detection in Natural Images”, Tech Report TR-2008-05, Department of Computer Science, University of Chicago, 2008.

- Xiaofeng Ren, Charless Fowlkes and Jitendra Malik. “Familiar Configuration Enables Figure-Ground Assignment in Natural Images”, in *Vision Science Society Meeting (VSS)*, Sarasota, 2005.
- Xiaofeng Ren, Charless Fowlkes and Jitendra Malik. “Mid-level Cues Improve Boundary Detection”, Tech Report CSD-05-1382, Computer Science Division, UC Berkeley, 2005.
- Xiaofeng Ren and Jitendra Malik. “The Ecological Statistics of Good Continuation: Multi-scale Markov Models for Contours”, in *Vision Science Society Annual Meeting (VSS)*, Sarasota, 2002.

## **PROFESSIONAL ACTIVITIES**

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### **Conference Area Chairs:**

CVPR 2015, ICCV 2015

### **Conference Program Committees:**

IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2005-  
 IEEE International Conference on Computer Vision (ICCV) 2007-  
 European Conference on Computer Vision (ECCV) 2006-  
 IEEE International Conference on Pattern Recognition (ICPR) 2008  
 International Joint Conference on Artificial Intelligence (IJCAI) 2009  
 Asian Conference on Computer Vision (ACCV) 2009  
 AAAI Conference on Artificial Intelligence (AAAI) 2012, Robotics Track 2012-

### **Workshop Organizer / Chair:**

First Workshop on Egocentric Vision (Egovision 09), in conjunction with CVPR 2009  
<http://www.seattle.intel-research.net/egovision09/program.html>  
 Second Workshop on Egocentric Vision (Egovision 12), in conjunction with CVPR 2012  
<http://egovision12.cc.gatech.edu/>  
 Workshop on RGB-D: Advanced Reasoning with Depth Cameras, in conjunction with RSS 2010  
[http://www.cs.washington.edu/ai/Mobile\\_Robotics/rgbd-workshop-2010/](http://www.cs.washington.edu/ai/Mobile_Robotics/rgbd-workshop-2010/)  
 2<sup>nd</sup> Workshop on RGB-D: Advanced Reasoning with Depth Cameras, in conjunction with RSS 2011  
[http://www.cs.washington.edu/ai/Mobile\\_Robotics/rgbd-workshop-2011/](http://www.cs.washington.edu/ai/Mobile_Robotics/rgbd-workshop-2011/)  
 3<sup>rd</sup> Workshop on RGB-D: Advanced Reasoning with Depth Cameras, in conjunction with RSS 2012  
[http://www.cs.washington.edu/ai/Mobile\\_Robotics/rgbd-workshop-2012/](http://www.cs.washington.edu/ai/Mobile_Robotics/rgbd-workshop-2012/)  
 4<sup>th</sup> Workshop on RGB-D: Advanced Reasoning with Depth Cameras, in conjunction with RSS 2013  
[http://www.cs.washington.edu/ai/Mobile\\_Robotics/rgbd-workshop-2013](http://www.cs.washington.edu/ai/Mobile_Robotics/rgbd-workshop-2013)  
  
 1<sup>st</sup> IEEE Workshop on Consumer Depth Cameras for Computer Vision  
<http://www.vision.ee.ethz.ch/CDC4CV/2011/>  
 2<sup>nd</sup> IEEE Workshop on Consumer Depth Cameras for Computer Vision  
<http://www.vision.ee.ethz.ch/CDC4CV/>

### **Books:**

[Consumer Depth Cameras for Computer Vision](#) (edited), Advances in Computer Vision and Pattern Recognition, Springer, 2013.

### **Journal Reviewer:**

International Journal on Computer Vision (IJCV), IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), Computer Vision and Image Understanding (CVIU)

## PRESENTATIONS

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- Real-time Object Recognition in Daily Activities, Intel Techfest, San Antonio, 2013
- Discriminatively Trained Sparse Code Gradients for Contour Detection, Spotlight Presentation, Neural Information Processing Systems (NIPS), 2012.
- Designing and Learning Local Features, Grail Lab Retreat, University of Washington, 2012.
- Learning Local Image Descriptors for Recognition, Scene Labeling, and Grouping, VASC Seminar, Carnegie Mellon University, Pittsburgh, 2012.
- Fine-Grained Kitchen Activity Recognition using an RGB-D Camera, 14<sup>th</sup> ACM International Conference on Ubiquitous Computing, Pittsburgh, 2012.
- Toward Robust Object Recognition in Daily Activities, Microsoft, Redmond, 2012.
- Solving Visual Perception with RGB+Depth, Microsoft Research, Redmond, 2012
- Beyond Recognition and Mapping: Solving Visual Perception in Everyday Settings, PC Client Group and Intel Labs, Santa Clara, 2012
- RGB-D Perception: Depth Camera Usages beyond Gesture and Gaming, University of California, Berkeley, 2012
- RGB-D Perception: Depth Camera Usages beyond Gesture and Gaming, Stanford University, 2012
- Beyond Category Classification: Real-World Recognition of Object Poses & Materials, Vision Seminar, University of Washington, Seattle, 2012.
- RGB-D Scene Labeling, Grail Seminar, University of Washington, Seattle, 2012
- Practical Mapping and Recognition Combining Color and Depth, 2<sup>nd</sup> RGB-D Workshop on Advanced Reasoning with Depth Cameras, Robotics Science and Systems, Los Angeles, 2011.
- RGB-D Object Perception: Toward Robust Recognition and Learning of Everyday Objects, ICRA Workshop on Mobile Manipulation, Shanghai, 2011
- RGB-D Perception: Depth Camera Usages beyond Gesture and Gaming, Microsoft Research Asia, Beijing, 2011.
- RGB-D Perception: Depth Camera Usages beyond Gesture and Gaming, Intel Labs China, Beijing 2011.
- RGB-D Perception: Depth Camera Usages beyond Gesture and Gaming, Industrial Affiliates Symposium on Visual Computing, Brown University, Providence, 2011
- Introduction to Depth Cameras: Gesture Computing and Beyond, Intel Techfest, Portland, 2011
- RGB-D Perception: Depth Cameras Usages Beyond Gesture and Gaming, CSE Departmental Colloquium, University of Washington, Seattle, 2010
- RGB-D Perception, WILLOW Seminar, Ecole Normale Supérieure / INRIA, Paris, 2010
- RGB-D Perception, Grail Seminar, University of Washington, Seattle, 2010
- Mid-level Vision: Representation, Probabilistic Modeling and Applications, Grail Seminar, University of Washington, Seattle, 2009
- Image Parsing: a Gestalt Approach, University of Massachusetts, Amherst, 2008
- Image Parsing: a Gestalt Approach, Pennsylvania State University, State College, 2008.
- Mid-level Vision: Representation, Probabilistic Modeling and Applications, MIT, Boston, 2007
- Mid-level Vision: Representation, Probabilistic Modeling and Applications, Univ. of Pennsylvania, Philadelphia, 2007
- Segmentation, Tracking and Recognition: A Visual Trio, VASC Seminar, Carnegie Mellon University, Pittsburgh, 2007
- Segmentation, Tracking and Recognition: A Visual Trio, PAML Seminar, UIUC, Urbana, 2007

- Finding, Tracking, and Segmenting People in Video, Microsoft Research, Redmond, 2007
- Probabilistic Models for Image Parsing, VASC Seminar, Carnegie Mellon University, Pittsburgh, 2006
- Figure/Ground Assignment in Natural Images, European Conference on Computer Vision (ECCV), Graz, 2006
- Probabilistic Models for Parsing Images, Toyota Technological Institute at Chicago, Chicago, 2006
- Probabilistic Models for Parsing Images, Microsoft Research, Redmond, 2006
- Probabilistic Models for Parsing Images, BASiCS Group, UC Berkeley, Berkeley, 2006
- Scale-Invariant Random Fields for Mid-level Vision, State Key Lab. of CAD&CG, Zhejiang University, Hangzhou, 2005
- Learning Scale-Invariant Contour Completion, DAGS Group, Stanford University, Stanford, 2005
- Learning a Scale-Invariant Model for Curvilinear Continuity, MSRI Workshop on Perceptual Organization, Berkeley, 2005
- Learning a Classification Model for Segmentation, International Conference on Computer Vision (ICCV), Nice, 2003

## **TEACHING EXPERIENCES**

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- Guest Speaker, Kinect Camera Capstone, CSE 481c, Fall 2012, University of Washington
- Guest Speaker, Probabilistic Robotics, CSE 571, Winter 2012, University of Washington
- Co-instructor, CSE 590K Research Seminar, RGD-D Perception: Advanced Reasoning with Depth Cameras, 2010 and 2011, Computer Science & Engineering, University of Washington
- Organizer, RGB-D Seminars, 2008-2011, Intel Labs Seattle
- Guest Speaker, Computer Vision, CSE 455, Spring 2010, University of Washington
- Guest Speaker, Computer Vision, CSE 455, Fall 2009, University of Washington
- Guest Speaker, Introduction to Computer Vision, CMSC 35040, Spring 2007, University of Chicago
- Graduate Student Instructor, CS188 Introduction to Artificial Intelligence, Fall 2000, UC Berkeley
- Teaching Assistant, CS205 Mathematical Methods in Robotics and Vision, Spring 1999, Stanford
- Teaching Assistant, CS249 Objected-Oriented Programming, Winter 1999, Stanford
- Teaching Assistant, Introduction to Mathematical Analysis, Spring 1997, Zhejiang University