

**Research Scientist**

School of Interactive Computing  
Georgia Institute of Technology  
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Gender: Male

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**Research Interests**

Computer vision, machine learning, pattern recognition and natural language processing. Specific interests in segment-based object recognition, scene understanding and semantic segmentation, video object segmentation and recognition, composite statistical inference, large-scale machine learning, Monte Carlo methods, random Fourier methods, kernel methods.

**Education**

- **Institute of Automation–Chinese Academy of Sciences** Beijing, China  
*Ph.D., Pattern Recognition and Intelligent Systems* Sep. 2003 - Aug. 2008
  - Advisor: Jue Wang
  - Thesis: Euclidean Metric Learning
- **Zhejiang University** Hangzhou, ZJ, China  
*B.S., Computer Science and Engineering* Sep. 1997 - Jun. 2001

**Professional Experience**

- **Georgia Institute of Technology** Atlanta, GA, USA  
*Research Scientist* Dec. 2012 - now
  - Supervisor: James M. Rehg
  - Research Topics: Video Segmentation, Unsupervised Image Segmentation, 3D Reconstruction from Video, Affordance Analysis, Continuous-Time Hidden Markov Models, Visual Object Tracking.
- **Georgia Institute of Technology** Atlanta, GA, USA  
*Postdoctoral Researcher* Feb. 2011 - Nov. 2012
  - Supervisor: Guy Lebanon and Haesun Park
  - Research Topics: Sentiment Analysis, Recommender Systems, Random Fourier methods, Composite Statistical Inference, Semantic Segmentation
- **University of Bonn** Bonn, NRW, Germany  
*Postdoctoral Researcher* Sep. 2008 - Dec. 2010
  - Supervisor: Cristian Sminchisescu
  - Research Topics: Kernel Methods, Semantic Segmentation, Multiple-Instance Learning, Random Fourier Methods, Kernel/Metric Learning, Pose Estimation
- **Chinese Academy of Railway Sciences** Beijing, China  
*Programmer* Sep. 2001 - Nov. 2002
  - Worked on the rail ticket booking system for the Chinese railway network.

- Worked on: Improving performance of concurrent database requests during peak periods (Chunyun); a ticket price calculator; designing an information sharing system across heterogeneous systems.

## Teaching Experience

- **Georgia Institute of Technology** Atlanta, GA, USA  
*Probabilistic Graphical Models* CS 8803 PGM
  - 6 lectures, Spring 2014
  - 4 lectures, Spring 2013
- **Georgia Institute of Technology** Atlanta, GA, USA  
*Machine Learning I* CSE 6740
  - 2 guest lectures, Fall 2013
- **University of Bonn** Bonn, Germany  
*Computer Vision* Graduate Course
  - Tutor and 2 lectures, 2010
- **Peking Union Medical College** Beijing, China  
*Introduction to Proteomics* Graduate Course
  - 1 guest lecture every year, 2004-2007
- University of Chinese Academy of Sciences** Beijing, China  
*Machine Learning Research* Graduate Course
  - 1 guest lecture every year, 2005-2007

## Grants Awarded

- **RI: Small: A Compositional Approach to Video Segmentation**  
*National Science Foundation (NSF)* Oct. 2013 - Sep. 2016
  - Co-Principal Investigator (co-PI) with James M. Rehg, \$499,443.00
- Image Processing, Behavioral Modeling and Environment**
- **Modeling**  
*BMW* Aug. 2014 - Jul. 2017
  - Co-Principal Investigator (co-PI) with James M. Rehg, \$480,000.00
- **NVIDIA Hardware Donation Grant**  
*NVIDIA Corporation* Feb. 2015
  - 2 Tesla K40 GPGPUs (worth about \$7,000)

## Grants Pending

- CRII: RI: Large-Scale Discovery of Subcategories and Parts**
- **from Image and Video Segments**  
*National Science Foundation (NSF)*
  - Principal Investigator, \$165,375.00
- Comp Cog: Collaborative Research on the Development of**
- **Visual Object Recognition**  
*National Science Foundation (NSF)*
  - Co-Principal Investigator (co-PI) with James M. Rehg, Maithilee Kunda, \$358,579.00
  - Collaborative research with Linda Smith and Chen Yu from Indiana University Bloomington

## Honors

- 2009-2012, participation in the PASCAL VOC Segmentation Challenge (Most prestigious challenge in visual object recognition, participants include universities such as University of California – Berkeley, University of Chicago, Stanford University, University of Oxford, etc.).
  - 2009, winner of the comp5 (semantic segmentation, train without additional training data) challenge, test set average precision (AP) 36.5%.
  - 2010, co-winner of the comp5 challenge, AP 39.7%.
  - 2011, winner of the comp5 challenge, AP 43.3%.
  - 2012, winner of the comp6 (semantic segmentation, train with additional training data) challenge (AP 47.5%), 2nd place of the comp5 challenge (AP 45.4%, improved to 47.5% after the challenge is over).
- 2012, Best reviewers award for ACCV 2012.
- 2011, Outstanding reviewer award for ICCV 2011.
- 2010, DAGM Paper Prize.
- 2005, Microsoft Fellowship. \$6,000 (only 40 recipients per year across the entire Asia-Pacific region).
- 2005, First Class Scholarship. Institute of Automation, Chinese Academy of Sciences.
- 2005, Liuyongling Scholarship. Chinese Academy of Sciences.

## Publications

Google Scholar Citations=732, h-index=14

My Citations Homepage <http://scholar.google.com/citations?user=snDpfA0AAAAAJ&hl=en>

## Preprints

1. Fuxin Li, Guy Lebanon, Cristian Sminchisescu. A Linear Approximation to the  $\chi^2$  Kernel with Geometric Convergence. arXiv:1206.4074. [cs.LG]
2. Fuxin Li, Joao Carreira, Guy Lebanon, Cristian Sminchisescu. Composite Statistical Learning and Inference for Semantic Segmentation. To be submitted.

## Journals and Book Chapters

1. Lora Weiss, Erica Briscoe, Heather Hayes, Olga Kemenova, Sim Harbert, Fuxin Li, Guy Lebanon, Chris Stewart, Darby Miller Steiger, Dan Foy. A Comparative Study of Social Media and Traditional Polling in the Egyptian Uprising of 2011. *Social Computing, Behavioral-Cultural Modeling and Prediction*, Springer 2013, pp 303-310.
2. Jaegul Choo, Fuxin Li, Keehyoung Joo, Haesun Park. A Visual Analytics Approach for Protein Disorder Prediction. *Expanding the Frontiers of Visual Analytics and Visualization*, Springer 2012, pp 163-174.
3. João Carreira, Fuxin Li, Cristian Sminchisescu. Object Recognition by Sequential Figure-Ground Ranking. *International Journal of Computer Vision (IJCV)*. (First two authors contributed equally), 2012 (98):3, 243-262.
4. Fen Xia, Yanwu Yang, Liang Zhou, Fuxin Li, Min Cai, Daniel D. Zeng: A closed-form reduction of multi-class cost-sensitive learning to weighted multi-class learning. *Pattern Recognition (PR)* 42(7): 1572-1581 (2009).
5. Chen Shao, Wei Sun, Fuxin Li, Ruifeng Yang, Ling Zhang, Youhe Gao. Oscore: a combined score to reduce false negative rates for peptide identification in tandem mass spectrometry analysis. *Journal of Mass Spectrometry*. 2009(14):1, 25-31.

6. Wei Sun, Yong Chen, Fuxin Li, Ling Zhang, Ruifeng Yang, Zhi Zhang, Dexian Zheng, Youhe Gao. Dynamic urinary proteomic analysis reveals stable proteins to be potential biomarkers. *Proteomics - Clinical Applications*. 2009(3):3, 370-382
7. Fen Xia, Wensheng Zhang, Fuxin Li, Yanwu Yang. Ranking with Decision Tree. *Knowledge and Information Systems*. 2008 (17):3, 381-395.
8. Linjie Wang, Fuxin Li, Wei Sun, Shuzhen Wu, Xiaorong Wang, Ling Zhang, Dexian Zheng, Jue Wang and Youhe Gao. Concanavalin A-captured Glycoproteins in Healthy Human Urine. *Molecular & Cellular Proteomics*. 2006(5): 560 - 562
9. Wei Sun, Fuxin Li, Shuzhen Wu, Xiaorong Wang, Dexian Zheng, Jue Wang, Youhe Gao. Human urine proteome analysis by three separation approaches. *Proteomics*. 2005(5): 4994-5001
10. Fuxin Li, Wei Sun, Youhe Gao, Jue Wang. RScore: A Peptide Randomicity Score For Evaluating MS/MS Spectra. *Rapid Communications in Mass Spectrometry*. 2004(18):14,1655-1659
11. Wei Sun, Fuxin Li, Jue Wang, Dexian Zheng, Youhe Gao. AMASS: Software for Automatically Validating the Quality of MS/MS Spectrum From SEQUEST Results. *Molecular & Cellular Proteomics*. 2004(3): 1194-1199

## Conferences

1. Zhengyang Wu, Fuxin Li, Rahul Sukthankar, James M. Rehg. Robust Video Segment Proposals with Painless Occlusion Handling. In *IEEE Conference on Computer Vision and Machine Learning (CVPR)*, 2015.
2. Rahul Sawhney, Fuxin Li, Henrik I. Christensen. GASP : Geometric Association with Surface Patches. In *International Conference on 3D Vision (3DV)*, 2014.
3. Abhijit Kundu, Yin Li, Frank Dellaert, James M. Rehg, Fuxin Li. Joint Semantic Segmentation and 3D Reconstruction from Monocular Video. In *European Conference of Computer Vision (ECCV)*, 2014.
4. Ahmad Humayun, Fuxin Li, James M. Rehg. RIGOR: Reusing Inference in Graph Cuts for generating Object Regions. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2014.
5. Fuxin Li, Taeyoung Kim, Ahmad Humayun, David Tsai, James M. Rehg. Video Segmentation by Tracking Many Figure-Ground Segments. In *IEEE International Conference on Computer Vision (ICCV)*, 2013.
6. Tucker Hermans, Fuxin Li, James M. Rehg, Aaron F. Bobick. Learning Contact Locations for Pushing and Orienting Unknown Objects . In *IEEE-RAS International Conference on Humanoid Robots (Humanoids)*, 2013.
7. Tucker Hermans, Fuxin Li, James M. Rehg, Aaron F. Bobick. Learning Stable Pushing Locations. In *IEEE International Conference on Development and Learning (ICDL)*, 2013.
8. Fuxin Li, Joao Carreira, Guy Lebanon, Cristian Sminchisescu. Composite Statistical Inference for Semantic Segmentation. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2013.
9. Seungyeon Kim, Fuxin Li, Guy Lebanon, Irfan Essa. Beyond Sentiment: The Manifold of Human Emotions. In *Proceedings of the 16th International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2013.
10. Mingxuan Sun, Fuxin Li, Joonseok Lee, Ke Zhou, Guy Lebanon, Hongyuan Zha. Learning Multiple-Question Decision Trees for Cold-Start Recommendation. In *ACM International Conference on Web Search and Data Mining (WSDM)*, 2013 (Spotlight presentation).
11. Edwards G. Bazavan, Fuxin Li, Cristian Sminchisescu. Learning Random Kernel Approximations for Object Recognition. In *European Conference of Computer Vision (ECCV)*, 2012 (**oral presentation, 2.8% acceptance rate**).
12. Fuxin Li, Guy Lebanon, Cristian Sminchisescu. Chebyshev Approximations to the Histogram Chi-Square Kernel. In *IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)*, 2012.
13. Catalin Ionescu, Fuxin Li, Cristian Sminchisescu. Latent Structured Models for Human Pose Estimation. In *IEEE International Conference on Computer Vision (ICCV)*, 2011 (**Oral presentation, 3.1% acceptance rate**).

14. Fuxin Li, Cristian Sminchisescu. Convex Multiple Instance Learning by Estimating Likelihood Ratio, *Advances in Neural Processing Systems (NIPS)*, 2010.
15. Fuxin Li, Catalin Ionescu, Cristian Sminchisescu. Random Fourier Approximations for Skewed Multiplicative Histogram Kernels. In *German Association for Pattern Recognition (Deutsche Arbeitsgemeinschaft für Mustererkennung, (DAGM))*, 2010. **DAGM prize paper**.
16. Fuxin Li, João Carreira, Cristian Sminchisescu. Object Recognition as Ranking Holistic Figure-Ground Hypotheses. In *IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)*, 2010 (First two authors contributed equally).
17. Fuxin Li, Cristian Sminchisescu. The Feature Selection Path in Kernel Methods. In *Artificial Intelligence and Statistics (AISTATS)*, 2010.
18. Fuxin Li, Yunshan Fu, Yu-Hong Dai, Cristian Sminchisescu, and Jue Wang. Kernel Learning by Unconstrained Optimization. *Artificial Intelligence and Statistics (AISTATS)*, 2009.
19. Liang Zhou, Fuxin Li, Yanwu Yang. Path Algorithms for One-Class SVM. *International Symposium on Neural Networks (ISNN)*, 2008.
20. Zongying Song, Chunhong Pan, Q Yang, Fuxin Li, Wei Li. Building Roof Detection from a Single High-Resolution Satellite Image in Dense Urban Area. In ISPRS 2008, Congress of the International Society for Photogrammetry and Remote Sensing.
21. Fuxin Li, Jian Yang, Jue Wang. A Transductive Framework of Distance Metric Learning by Spectral Dimensionality Reduction. In Proceedings of *International Conference on Machine Learning (ICML)*, 2007
22. Jian Yang, Fuxin Li, Jue Wang. A Better Scaled Local Tangent Space Alignment Algorithm. In Proceedings of *International Joint Conference on Neural Networks (IJCNN)*, 2005

## Invited Talks

### Conference and Workshops

- Composite Statistical Learning and Inference in Semantic and Video Segmentation:* at Perceptual Organization in Computer Vision Workshop, Columbus, OH, USA, June 2014.
- Object Recognition by Sequential CPMC Segment Ranking*, The PASCAL Visual Object Classes Challenge Workshop 2011, Barcelona, Spain, November 2011.

### Universities and Companies

- Composite Statistical Learning and Inference*, at Rutgers University, Piscataway, New Jersey, USA, September 2014.
- Composite Statistical Learning and Inference*, at National Institute of Health Clinical Center, Bethesda, Maryland, USA, August 2014.
- Composite Statistical Learning and Inference*, at Xidian University, Xi'an, China, July 2014.
- Composite Statistical Learning and Inference* at Baidu Inc., Beijing, China, January 2014.
- Composite Statistical Learning and Inference* at Samsung Research., Beijing, China, January 2014.
- Object Recognition as Ranking Holistic Figure-Ground Hypotheses* at Georgia Institute of Technology, Computational Science and Engineering Seminar, Atlanta, GA, USA, February 2012.
- Object Recognition as Ranking Holistic Figure-Ground Hypotheses and Convex Multiple Instance Learning:* at Tsinghua University, Beijing, China, January 2011.
- AMASS: software for automatically validating the quality of MS/MS spectrum from SEQUEST results:* at Institute of Computing Technologies, Chinese Academy of Sciences, Beijing, China, December 2005.

## Professional Activities

Co-organizer (Fabio Galasso, Fuxin Li, Thomas Brox, Bernt Schiele, James M. Rehg) of the First International Workshop on Video Segmentation, in conjunction with ECCV 2014.

Conference Reviewer: ICCV 2011 (outstanding reviewer) - 2015, ECCV 2012-2014, CVPR 2013-2015, NIPS 2011, 2013-2014, ICML 2014-2015, ACCV 2012 (best reviewers) - 2014, CIKM 2012, Supercomputing 2013, IJCAI 2011, Humanoids 2013-2014, AISTATS 2015.

Journal Reviewer: IEEE Transactions in Pattern Analysis and Machine Intelligence (**PAMI**); International Journal on Computer Vision (**IJCV**); Journal of Machine Learning Research (**JMLR**); the Data Mining and Knowledge Discovery Journal (**DMKD**); the Pattern Recognition journal (**PR**); IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**); Computer Vision and Image Understanding (**CVIU**); Journal of Selected Topics in Signal Processing (**JSTSP**); ACM Transactions on Intelligent Systems and Technology (**TIST**); AI Communications (**AIC**); IEEE Transactions on Image Processing (**ITIP**); IEEE Transactions on Circuits and Systems for Video Technology (**JCSVT**); the Neurocomputing Journal.

## Student Supervision

- Ahmad Humayun (Georgia Institute of Technology, Ph.D., co-advised with James M. Rehg)
- Chanho Kim (Georgia Institute of Technology, Ph.D., co-advised with James M. Rehg)
- Rahul Sawhney (Georgia Institute of Technology, Ph.D., co-advised with Henrik Christensen)
- Mingxuan Sun (Georgia Institute of Technology, Ph.D., mentored with advisor Guy Lebanon)
- Catalin Ionescu (University of Bonn, Ph.D., mentored with advisor Cristian Sminchisescu)
- Eduard G. Bazavan (Institute of Mathematics of the Romanian Academy, M.S., mentored with advisor Cristian Sminchisescu)

## References

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