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Shell Xu Hu

Research Interests

Machine Learning	Structured Output Learning, Latent Structure Models, Reinforcement Learning
Computer Vision	Object Recognition, Hierarchical Image Representation
Others	Computational Neuroscience, Bayesian Statistics, Optimization, Graph Theory

Education

2012.9–present **Master in Computer Science**,
Oregon State University, USA.

2011.9–2012.9 **Master in Computer Vision and Artificial Intelligence**,
Universitat Autonòma de Barcelona, Spain.

2006.9–2010.7 **Bachelor in Software Engineering**,
Hangzhou Dianzi University, China.

Projects

2014.5–2014.10 **Structured Output Learning with Approximate Inference**, *Google Summer of Code 2014 with Shogun Machine Learning Toolbox*.

- Working as a mentor, supervising a student who is implementing approximate MAP inference, such as GraphCuts, MPLP and TRW-S.
- Implementing online SOSVM solvers: dual coordinate descent and online exponential gradient descent.
- Implementing dual loss formulation of SOSVM using Dual Decomposition as inference.

2014.3–2014.6 **Dual Decomposition Using Frank-Wolfe Algorithm**, *Course Project of Convex Optimization*.

- Reformulated Dual Decomposition as a constrained convex optimization.
- Using Frank-Wolfe algorithm for the master problem of Dual Decomposition.
- Report link: http://hushell.github.io/papers/hulam_ece599.pdf.

2013.7–present **Tree Cutting for Semantic Segmentation**, *Oregon State University*.

- Proposed a latent hierarchical tree model for scene labeling, where parameters are associated with node merging/summing.
- Proposed a dynamic programming algorithm for finding the MAP labeling and cutting the tree into a forest.
- Proposed a learning algorithm for hierarchical graphical model with dynamic structure.

2013.5–2013.10 **Large Scale Learning of General Structured Output Models**, *Google Summer of Code 2013 with Shogun Machine Learning Toolbox*.

- Implemented the factor graph model and MAP inference framework.
- Implemented online structured SVM solvers: stochastic gradient descent and block-coordinate Franke-Wolfe algorithm.
- IPython notebook link: http://nbviewer.ipython.org/6865729.

2012.11–present **Next Generation Phenomics for Tree of Life**, *Oregon State University*.

- Proposed a reconfigurable part model for encoding structural variations among species.
- Proposed a zero-shot learning algorithm for transferring learned models between species.
- Co-developed a search-based structured prediction for detecting biological characters.

2011.10–2012.9 **Towards Real-Time Part-Based Pedestrian Detection**, *Universitat Autonòma de Barcelona*.

- Developed histogram-of-gradients feature on GPU.
- Studied a coarse-to-fine inference for hierarchical part-based models.
- Developed a real-time pedestrian detection system.

2010.5–2011.9 **Kinect Interactive Multimedia Platform**, *Hangzhou Dianzi University*.

- Developed an automatic figure-ground video segmentation algorithm based on Graph Cuts.
- Integrated OpenCV and OpenGL for Kinect application.

2010.4–2010.9 **Cross-platform GUI Toolkit for Embedded System**, *Hangzhou Dianzi University*.

- Developed an event-processing mechanism based on libSDL.
- Designed widgets of graphical user interface for embedded systems.
- Developed a demo of graphical user interface for industrial control.

2009.5–2009.9 **Multi-Touch Coffee Table**, *Project for Shanghai World Expo 2010*.

- Developed a finger tracking method.

Papers

- S. X. Hu, S. Todorovic, **The Bag-of-Words Revisited: Latent Semantic Pooling for Scene Classification**, Tech. Report 2014.
- S. X. Hu, M. Lam, S. Todorovic, T. G. Dietterich, A. Cirranello, P. Velazco, N. Simmons, M. O'Leary, **Zero-Shot Learning and Detection of Teeth in Images of Bat Skulls**, ICCV Workshop on Computer Vision for Accelerated Bioscience, 2013.
- M. Q. Lam, J. R. Doppa, S. X. Hu, A. Reft, S. Todorovic, T. G. Dietterich, M. Daly, **Learning to Detect Basal Tubules of Nematocysts in SEM Images**, ICCV Workshop on Computer Vision for Accelerated Bioscience, 2013.
- J. Xu, S. Ramos, S. X. Hu, D. Vázquez and A. M. López, **Multi-task Bilinear Classifiers for Visual Domain Adaptation**, NIPS Workshop on New Directions in Transfer and Multi-Task: Learning Across Domains and Tasks, 2013.
- M. Pedersoli, S. X. Hu, J. Gonzalez and X. Roca, **Towards a Real-Time Pedestrian Detection based only on Vision**, Journal of Intelligent Transportation System, 2013.
- S. X. Hu, C. Jiang, **huG: A Lightweight Platform Independent GUI Library for Embedded System**, Journal of Chinese Computer Engineering, 2011.
- S. X. Hu, C. Jiang, W. Zhang, J. Zhang, R. Yu, C. Lv, **An Event Based GUI Programming Toolkit for Embedded System**, APSCC, 2010.
- Y. Zhao, C. Jiang, S. X. Hu, **Remote Sensing Image Processing Based On CUDA Platform**, IEEE International Conference on Remote Sensing, 2010.

Work Experience

2010.7–2011.7 **Research Engineer**, *Grid and Service Computing Lab, Hangzhou Dianzi University*.

- Developed a web GUI for Xen virtual machine resource monitoring.
- Co-developed a GPU Accelerated remote sensing image processing system.

2009.10–2010.4 **Intern**, *Huawei Technologies Co. Ltd.*.

- Participated in the project of multimedia messaging service system.

2008.11–2009.5 **Intern**, *NewMsg Technologies Co. Ltd.*.

- Developed a Chinese texting module for wireless hand-held device.

Teaching Experience

Fall 2011 **Teaching Assistant**, *Fundamentals of Informatics*, Department of Computer Science, Universitat Autònoma de Barcelona, Spain.

Programming Skills

Languages C/C++ (advanced), Matlab (advanced), Python (intermediate) etc.

Tools Vim (advanced), Git (advanced), Latex (advanced), Shogun (intermediate), CUDA (intermediate), OpenCV (intermediate), OpenGL, Qt, Kinect SDK, CMake etc.

Awards

2009 **Outstanding Undergraduate Student Research Award**, *School of Computer Science and Software Engineering, Hangzhou Dianzi University*.

2008 **Second Prize**, *China Undergraduate Mathematical Contest in Modeling*.

2009 **Successful Participants**, *Mathematical Contest in Modeling Contest*.

Coursework

- Artificial Intelligence
- Theory of Statistics
- Applied Stochastic Models
- Convex Optimization
- Fundamentals of Neuroscience
- Introduction to Graphical Models
- Bayesian Statistics
- Computer Vision and Machine Learning
- Algorithms and Graph Theory
- Real Analysis