

# SHENGYANG DAI

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- CONTACT Department of EECS Phone: (224) 622-4159(C), (847) 491-4466(O)  
Northwestern University Email: s-dai@northwestern.edu  
2145 Sheridan Road, Tech. L440 Fax: (847) 491-4455  
Evanston, IL 60208, USA. http://www.ece.northwestern.edu/~sda690/
- RESEARCH INTERESTS **Image/video processing**  
including image enhancement, super resolution, inpainting, and video deinterlacing  
**Computer vision**  
including vision-based detection and tracking, image search, and 3D geometry  
**Machine learning and pattern recognition**
- EDUCATION **Northwestern University**, EVANSTON, ILLINOIS, USA 08/2005 - 06/2009 (expected)  
• *Ph.D. Student*, Electrical Engineering and Computer Science Department  
• Advisor: Prof. Ying Wu  
• *Research area*: image enhancement, vision-based detection and tracking  
**Tsinghua University**, BEIJING, CHINA 09/2001 - 07/2004  
• *M.S.*, Electrical Engineering Department  
• Advisor: Prof. Yujin Zhang  
• *Thesis*: Matching and learning for image search  
**Tsinghua University**, BEIJING, CHINA 09/1997 - 07/2001  
• *B.E.*, Electrical Engineering Department
- WORK EXPERIENCE **Department of EECS, Northwestern University** EVANSTON, IL, USA  
RESEARCH ASSISTANT 08/2005 - PRESENT  
*Advisor: Prof. Ying Wu*  
- **Image enhancement**, especially on **space-variant motion/blur estimation and recovery** from a **single** image. A unified framework for the **general** space-variant case is proposed first time in the literature, by bridging the study of motion in computer vision and blur estimation in image processing. It enables high quality image recovery and editing.  
- **Detector ensemble** for object detection in presence of **severe occlusion**.  
- **Tracking** fast moving object in presence of motion blur.
- Vision Research Group, Google Research** MOUNTAIN VIEW, CA, USA  
SUMMER INTERN 06/2008 - 09/2008  
*Advisor: Dr. Mei Han and Dr. Vivek Kwatra*  
- **Image inpainting and enhancement** for building facades in 3D city reconstruction with repetitive pattern discovery and shadow removal.
- Interactive Visual Media Group, Microsoft Research** REDMOND, WA, USA  
SUMMER INTERN 06/2007 - 09/2007  
*Advisors: Dr. Simon Baker and Dr. Sing Bing Kang*  
- **Video deinterlacing** with global adaptation and exemplar-based enhancement. The algorithm demonstrates significantly favorable performance over existing softwares and research papers, with **real time** efficiency based on extensive tests.
- NEC Laboratories America, Inc.** CUPERTINO, CA, USA  
SUMMER INTERN 06/2006 - 09/2006  
*Advisors: Dr. Mei Han (now at Google) and Dr. Yihong Gong*  
- **Image super resolution** by **Softcuts**. High resolution images with smooth and sharp edges are obtained by minimizing the novel metric of soft edge smoothness on alpha channel.

**Department of CS, University of Southern California**      LOS ANGELES, CA, USA  
RESEARCH ASSISTANT      08/2004 - 08/2005  
*Advisor: Prof. Isaac Cohen (now at Honeywell)*  
- **Video surveillance** with motion estimation, 3D parallax removal, and image segmentation.

**Department of EE, Tsinghua University**      BEIJING, CHINA  
RESEARCH ASSISTANT      11/2000 - 07/2004  
*Advisor: Prof. Yujin Zhang*  
- **Image search** by region-based matching and user feedback.  
- **Image segmentation** and its application in **medical** image processing.

**Samsung Advanced Institute of Technology (SAIT)**      BEIJING, CHINA  
SUMMER INTERN      07/2003 - 09/2003  
*Advisor: Dr. Maolin Chen*  
- Office environment surveillance.

**Microsoft Research, Asia (MSRA)**      BEIJING, CHINA  
SUMMER INTERN      07/2002 - 09/2002  
*Advisor: Dr. Lin Liang*  
- Face alignment and segmentation.

#### PATENTS

- “Choosing Video Deinterlacing Interpolant Based on Cost”. Inventors: **Shengyang Dai**, Simon Baker, and Sing Bing Kang, patent pending (2008) (this algorithm has been shipped as part of **Microsoft Expression Encoder 2** and also used to enhance content for **Xbox Live Marketplace**).
- “Soft Edge Smoothness Prior and its Application on Alpha Channel Super Resolution”. Inventors: **Shengyang Dai**, Mei Han, Wei Xu, Ying Wu, and Yihong Gong, granted on Jun. 5, 2008.
- “Robust Object Tracking System”. Inventors: Ying Wu, Ming Yang, **Shengyang Dai**, and Shihong Lao, granted on Dec. 21, 2007.

#### SELECTED PUBLICATIONS

##### Refereed journal papers and book chapter

- **Shengyang Dai** and Ying Wu, “Motion from a Single Blurred Image”, *International Journal on Computer Vision (IJCV)* (under review).
- **Shengyang Dai**, Simon Baker, and Sing Bing Kang, “An MRF-Based Deinterlacing Algorithm with Exemplar-Based Refinement”, *IEEE Transactions on Image Processing (T-IP)* (accepted).
- **Shengyang Dai**, Mei Han, Wei Xu, Ying Wu, Yihong Gong, and Aggelos K.Katsaggelos, “Softcuts: A Soft Edge Smoothness Prior for Color Image Super Resolution”, *IEEE Transactions on Image Processing (T-IP)* (accept).
- Ming Yang, **Shengyang Dai**, Ying Wu, and Aggelos K.Katsaggelos, “Tracking Motion-blurred Targets”, *IEEE Transactions on Image Processing (T-IP)* (under review).
- **Shengyang Dai** and Yujin Zhang, “Color Image Segmentation in both Feature and Image Space”, *Advances in Image and Video Segmentation*, 2006.
- **Shengyang Dai** and Yujin Zhang, “Unbalanced Region Matching Based on Two-Level Description for Image Retrieval”, *Pattern Recognition Letters*, (26)5: 565-580, 2005.

## Refereed conference papers

- **Shengyang Dai** and Ying Wu, “Title Omitted Due to Blind Review”, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR’09)*, 2009 (submitted).
- **Shengyang Dai** and Ying Wu, “Estimating Space-Variant Motion Blur without Deblurring”, to appear in *IEEE Conference on Image Processing (ICIP’08)* (**oral**).
- **Shengyang Dai** and Ying Wu, “Motion from Blur”, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR’08)*, Anchorage, Alaska, June 23-28, 2008 (**oral, 63/1593=4.0%**).
- **Shengyang Dai**, Mei Han, Ying Wu, and Yihong Gong, “Bilateral Back Projection for Single Image Super Resolution”, *IEEE Conference on Multimedia & Expo (ICME’07)*, Beijing, China, July 2-5, 2007.
- **Shengyang Dai**, Mei Han, Wei Xu, Ying Wu, and Yihong Gong, “Soft Edge Smoothness Prior for Alpha Channel Super Resolution”, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR’07)*, Minneapolis, Minnesota, USA, June 18-23, 2007 (**oral, 60/1250=4.8%**).
- **Shengyang Dai**, Ming Yang, Ying Wu, and Aggelos K.Katsaggelos, “Detector Ensemble”, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR’07)*, Minneapolis, Minnesota, USA, June 18-23, 2007.
- **Shengyang Dai**, Ming Yang, Ying Wu, and Aggelos K.Katsaggelos, “Tracking Motion-blurred Targets in Video”, *IEEE Conference on Image Processing (ICIP’06)*, Atlanta, GA, USA, Oct 8-11, 2006.
- **Shengyang Dai** and Yujin Zhang, “AdaBoost in Region-Based Image Retrieval”, in Proc. *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP’04)*, vol. 3: 429-432, Canada, May 17-21, 2004.
- **Shengyang Dai** and Yujin Zhang, “Color Image Segmentation with Watershed on Color Histogram and Markov Random Fields”, in Proc. *IEEE Pacific-Rim Conference on Multimedia (PCM’03)*, p0240, Singapore, December 15-18, 2003.
- Kan Jiang, Qingmin Liao, and **Shengyang Dai**, “A Novel White Blood Cell Segmentation Scheme Using Scale-space Filtering and Watershed Clustering”, in Proc. *IEEE International Conference on Machine Learning and Cybernetics (ICMLC’03)*, Xi’an, vol. 5: 2820-2825, China, 2003 (Outstanding paper award).

## HONORS AND AWARDS

**Everly Fellowship** of Northwestern University ’08  
Student Travel Grant of IEEE Conf. on Computer Vision and Pattern Recognition ’07  
Student Travel Grant of Northwestern University ’07, ’08  
Tsinghua University Outstanding Graduate Student Scholarship (**14/800**) ’04  
National training team member for Intl. Math. Olympics (**20** from entire P. R. China) ’97

## ACADEMIC SERVICES

**Program committee:** IEEE Intl. Conf. on Multimedia and Expo (*ICME* ’07, ’08)  
**Reviewer:** IEEE Transactions on Image Processing, IEEE Transactions on Systems, Man, and Cybernetics, Journal of Electronic Imaging, *CVPR* ’06, ’07, *ICCV* ’07, *ECCV* ’08  
**Volunteer:** *CVPR*’07

## COMPUTER SKILLS

- Environment: Windows, Linux
- Proficiency in C/C++, Matlab, OpenCV, IPL, Microsoft Vision SDK, OpenGL

## REFERENCES

AVAILABLE UPON REQUEST