

WEI ZHANG

Postdoctoral Researcher

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RESEARCH AREAS

Computer Vision, Machine Learning, Pattern Recognition, Image Processing and Data Mining.

SKILLS

Computer Skills:

- **C/C++** programming in Dos / Windows / LINUX, seven years of experience.
- Very familiar with popular Machine Learning and Computer Vision software packages like Weka, Netlab, PRtool, OpenCV, SimLab etc.
- **Matlab**, seven years of experience, very familiar with the Statistics, Image Processing, Signal Processing, and Optimization Toolboxes.

Theoretical Skills:

- Proficient in Computer Vision, Machine Learning, Pattern Recognition theories and recent progresses.
- Solid mathematical background, accomplished in Mathematics, Statistics, Linear Algebra, Geometry, Optimization Algorithms etc.
- Familiar with Information Theories, Digital Signal Processing and Communication Technologies.

Electrical Engineering Skills:

- **Embedded System Design**, five years of experience, confident in System-on-Chip (SoC) and Graphic User Interface (GUI) design.

Personality:

- Feeling totally comfortable in team-working, communication, oral presentations and technical reports.
- Self motivated, creative, hardworking and enterprising.

HONORS & AWARDS

- **Two patent disclosures**, Hewlett-Packard Labs, 2009.
- **Certificate of Appreciation**, Hewlett-Packard Labs, 2009.
- **Discovery Channel News report on the "Responsive Mirror" project:**
<http://dsc.discovery.com/news/2008/01/23/fitting-room-tech.html>.
- **Three patent applications**, Palo Alto Research Center (PARC), 2007.
- **Reviewers** of IUI 2009 (International Conference on Intelligent User Interfaces 2009) and TKDE (Transactions on Knowledge and Data Engineering).
- **Graduate Research Assistantship**, Oregon State University, 2004-present.
- **Xinxing Enterprise Scholarship**, Xi'an Jiaotong University (XJTU), 2003.
- **1st Place of 1st Class Award** in DSP groups in the 4th Motorola Embedded Processor (MCU/DSP) Design Contest, Shanghai, 2002.
- **Excellent Student Scholarships** at XJTU, 1998, 1999, 2001, 2002.

PROJECTS

Face Clustering for Consumer Photo Organization in Hewlett-Packard Labs – Computer Vision and Machine Learning:

Summary: On April, 2009, I joined the Multimedia Interaction and Understanding Lab (MIUL) in Hewlett-Packard Labs as a postdoctoral researcher. I worked on the application of face recognition and face clustering techniques to automated consumer album annotation and organization. I also co-authored grant proposal about the research on face recognition in highly complex environments.

Responsive Mirror Project in Palo Alto Research Center (PARC) – Computer Vision, Machine Learning and User Interface Design:

Summary: Worked in PARC from June, 2007 to December, 2007 as an intern, on Responsive Mirror (RM) project. Responsive Mirror uses multimedia devices, computer vision and machine learning techniques to produce an interactive display and intelligent clothes retrieval system.

Achievements: After six month's work, a working prototype is implemented and installed within PARC. Internal evaluation of the product shows that the system improves a lot in the users' confidence in the decision making and improves their shopping experience. Discovery Channel shown great interest on this new invention and reported with quite positive comments.

An introduction paper of the RM system is published as a full paper in IUI 2008 [4]; one companion paper was published in Workshop of CHI 2008 [6]. Another two papers about the system was published in ICDSC 2008 [7] and accepted to ACIVS 2008 [5]. Three patent applications have been submitted.

Insect Identification – Computer Vision, Image Processing and Machine Learning:

Summary: Started from 2004, I worked in the "Insect Identification" project [13] led by Prof. Thomas. G. Dietterich in Oregon State University. We seek to develop devices to automatically imaging and classifying insects with general image processing, machine learning and pattern recognition tools.

Problem: Focused on learning and recognition, we are facing a very difficult problem posed by the significant intra-class variation and subtle inter-class difference of the appearances of the insects in the captured images. In order to solve the problem, my research is focused on fusing supervised learning into low-level and mid-level vision.

Achievements: After thorough study and extensive experiments, we proposed PCBR detector [10], unsupervised [12] and supervised [2,8] visual codebook learning algorithms, discriminative feature selection algorithms [11] and achieve classification accuracy superior to human tests. Discriminative evaluation of the visual codebooks was published in [9]. The PCBR detector and the learning methods are also shown to be performing well on other bench-mark object recognition datasets.

Face Recognition – Computer Vision and Machine Learning:

Summary: From 2003 to 2004, I researched extensively on Machine Learning, Face Recognition and Data Mining in Xi'an Jiaotong University, China.

Topics: My topics were focused on supervised and unsupervised dimension reduction algorithms like Principal Component Analysis (PCA), Discriminant Analysis (DA) etc; "Kernel Tricks" in dimension reduction and classification; and the application of machine learning in extracting salient facial features for classification.

Achievements: Cooperating with Dr. Congde Lu, we contributed three papers on reputed publications. Comparative study of linear and kernel-based classification algorithms for face recognition was given in [14]; a novel binary classifier based on Support Vector Domain Description (SVDD) was proposed in [15]; and a nonlinear symmetrical PCA algorithm introduced in [16]. My

master's thesis on the research of face recognition algorithms and facial image datasets was highly evaluated by the department.

System-on-Chip (SoC) and Graphic User Interface (GUI) Design:

Summary: From 2000 to 2003, my research area was focused on the architecture and design of on-chip systems and graphic user interfaces for commercial communication instruments.

Projects and Achievements:

For my bachelor's senior design in XJTU, I developed the interactive GUI for a large-scale control system using C language. I also implemented socket communication between servers and clients in Linux environment. My thesis was evaluated as "Excellent" by the department. On 2002, I attended the 4th Motorola National Embedded Processor (MCU/DSP) Design Contest. Our product is "A 2M Transmission Quality Measurement Instrument based DSP Technology". I was in charge of the design of the whole software system, and the debugging of the LCD display, keyboard and Flash memory. We won the 1st place in the DSP groups after beaten hundreds of other teams.

EDUCATION

- Ph.D. (2004-2009) **Oregon State University (OSU), USA. GPA: 3.8**
School of Electrical Engineering and Computer Science
Advisor: Professor Thomas G. Dietterich
Ph.D. Dissertation: "Image features and learning algorithms for biological, generic and social object recognition".
- M.S. (2001-2004) **Xi'an Jiaotong University (XJTU), China. GPA: 3.5**
School of Electronic & Information Engineering
Advisor: Professor Taiyi Zhang
M.S. Thesis: "Research on Face Recognition Methods and Their Relations with Face Databases".
- B.E. (1997-2001) **Xi'an Jiaotong University (XJTU), China. GPA: 3.5**
School of Electronic & Information Engineering
B.E. Thesis: "Design of Graphic User Interface and Network Communication in Linux".

REFEREES

Prof. Thomas G. Dietterich (Ph.D. major Advisor): tgd@eecs.oregonstate.edu

Dr. Bo Begole (Advisor in PARC): bo@parc.com

Prof. Linda Shapiro (Colleague in "Insect Identification" project): shapiro@cs.washington.edu

Dr. Juan Liu (colleague in PARC): juan.liu@parc.com

Dr. Xiaoli Fern (Assistant Professor, cooperater on publications): xfern@eecs.oregonstate.edu

PUBLICATIONS

[1] Wei Zhang. Image features and learning algorithms for biological, generic and social object recognition. *Ph.D. Dissertation, Oregon State University, 2009.*

[2] Wei Zhang, Akshat Surve, Xiaoli Fern and Thomas Dietterich. Learning non-redundant codebooks for classifying complex objects. in *Proceedings of the 26th International Conference on*

Machine Learning (ICML), 2009.

[3] Gonzalo Martínez-Muñoz, **Wei Zhang** et al. Dictionary-free categorization of very similar objects via stacked evidence trees. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2009.

[4] **Wei Zhang**, Takashi Matsumoto, Juan Liu, Maurice Chu, Bo Begole. "An Intelligent Fitting Room Using Multi-Camera Perception". *2008 International Conference on Intelligent User Interface (IUI 2008)*.

[5] **Wei Zhang**, Nick Yee, Juan Liu, Maurice Chu, Bo Begole. "Augmented Fashion Exploration Based on Clothes Recognition". *Accepted to Advanced Concepts for Intelligent Vision Systems 2008 (ACIVS-2008)*.

[6] Bo Begole, Takashi Matsumoto, **Wei Zhang**, Juan Liu. "Responsive mirror: fitting information for fitting rooms". *Workshop on Ambient Persuasion at CHI 2008*.

[7] **Wei Zhang**, Bo Begole, Maurice Chu, Juan Liu, Nick Yee. "Real-Time Clothes Comparison Based on Multi-View Vision". *2nd ACM/IEEE International Conference on Distributed Smart Cameras (ICDSC-2008)*.

[8] **Wei Zhang**, Thomas G. Dietterich. "Learning Visual Dictionaries and Decision Lists for Object Recognition". *19th International Conference on Pattern Recognition (ICPR-2008)*.

[9] **Wei Zhang**, Hongli Deng. "Understanding Visual Dictionaries via Maximum Mutual Information Curves". *19th International Conference on Pattern Recognition (ICPR-2008)*.

[10] Hongli Deng, **Wei Zhang**, Thomas G. Dietterich and Eric N. Mortensen. "Principal Curvature-Based Region Detector for Object Recognition". *IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR) 2007*, oral paper.

[11] **Wei Zhang**, Hongli Deng, Thomas G. Dietterich, Eric N. Mortensen. "A Hierarchical Object Recognition System Based on Multi-scale Principal Curvature Regions". *Proceedings of the International Conference on Pattern Recognition (ICPR'06)*, Vol. 1. 778-782, 2006.

[12] Enrique Larios, Hongli Deng, **Wei Zhang**, Matt Sarpola, Jenny Yuen, Robert Paasch, Andrew Moldenke, David Lytle, Salvador Ruiz Correa, Eric Mortensen, Linda Shapiro, Tom Dietterich (submitted). "Automated Insect Identification through Concatenated Histograms of Local Appearance Features". *Machine Vision and Application (MVA)*, 2006.

[13] Eric N. Mortensen, Enrique L. Delgado, Hongli Deng, David Lytle, Andrew Moldenke, Robert K. Paasch, Linda Shapiro, Pengcheng Wu, **Wei Zhang**, Thomas G. Dietterich. "Pattern Recognition for Ecological Science and Environmental Monitoring: An Initial Report". *N. MacLeod and M. O'Neill (Eds.) Algorithmic Approaches to the Identification Problem in Systematics*.

[14] Congde Lu, Taiyi Zhang, **Wei Zhang** and Guang Yang. "An Experimental Evaluation of Linear and Kernel-based Classifiers for Face Recognition". *Lecture Notes in Computer Science, ISNN (2) 2005: 124-130*.

[15] Congde Lu, Taiyi Zhang and **Wei Zhang**. "Support Vector Domain Classifier Based on Multiplicative Updates". *IEICE TRANSACTIONS on Fundamentals of Electronics, Communications and Computer Sciences*. 2004, Vol.E87-A No.8 pp.2051-2053.

[16] Congde Lu, Chunmei Zhang, Taiyi Zhang, and **Wei Zhang**. "Kernel Based Symmetrical Principal Component Analysis for Face Classification". *Neurocomputing*. 2007.