Tian Cao

100 Rock Haven Road
APT E208
Carrboro, NC 27510

(919) 699-9542
tiancao@cs.unc.edu
tiancao.me

Interests

Machine Learning, Image Analysis, Computer Vision

Education

University of North Carolina at Chapel Hill, Chapel Hill, NC — 08/2015(expected)
Ph.D. candidate in Computer Science

Sichuan University, Chengdu, Sichuan, China — 06/2010
M.S. in Computer Science

Sichuan University, Chengdu, Sichuan, China — 05/2007
B.E. in Computer Science

Experience

Research Assistant, UNC Chapel Hill, Chapel Hill, NC — 09/2010-present
Coupled Dictionary Learning for Image Analysis

- Developed coupled dictionary learning methods for multi-modal image prediction, classification and registration.
- Learning coupled dictionaries based on sparse coding, and applied the learned dictionary to simplify the multi-modal image analysis problems.
- Applied the algorithm to Correlative Microscope images.
- Implemented in VTK, ITK, matlab and C++.

Research Intern, IBM Almaden Research Center, San Jose, CA — 05/2014-08/2014
Multi-atlas based Image Segmentation

- Investigated methods of learning from ambiguous labels.
- Investigated atlas based image segmentation methods with different local features and classifiers.
- Implemented atlas based image segmentation framework in Java and matlab.

Research Intern, Siemens Corporate Research, Princeton, NJ — 05/2012-08/2012
Real-time Object Detection in Ultrasound Videos

- Developed and implemented a needle detection method for ultrasound videos.
- Incorporated with different features and hough transform to vote the needle segment.
- Implemented a 3D steerable filtering method to incorporate spatial and temporal information for needle detection in C++.

Research Assistant, Chinese Academy of Sciences, Shenzhen, China — 09/2009-03/2010
Energy based Crowd Motion Analysis

- Developed an energy based crowd motion analysis algorithm based on mutual information.
- Applied the algorithm to detect the crowd abnormal behaviors.
- Implemented in OPENCV and C++.

Research Assistant, Sichuan University, Chengdu, China — 01/2008-09/2009
Super-resolution for Ultrasound Speckle Reduction

- Developed a fast and robust super-resolution method for intima reconstruction in ultrasound.
- Applied anisotropic diffusion to reduce speckle with edge enhancement in image reconstruction.
- Implemented anisotropic diffusion method in C++ and GLSL.

Publications

[1].**Tian Cao**, Nikhil Singh, Vladimir Jojic, Marc Niethammer, "Semi-coupled Dictionary Learning for Deformation Prediction", *International Symposium on Biomedical Imaging* (**ISBI**), 2015.

[2].**Tian Cao**, Christopher Zach, Marc Niethammer et al., "Multi-modal Registration for Correlative Microscopy using Image Analogies", *Medical Image Analysis* (**MedIA**), Elsevier, 2014.

[3].**Tian Cao**, Vladimir Jojic, Marc Niethammer et al., "Robust Multimodal Dictionary Learning", *The 16th International Conference on Medical Image Computing and Computer Assisted Intervention* (**MICCAI**), 2013.

[4].**Tian Cao**, Christopher Zach, Marc Niethammer et al., "Registration for Correlative Microscopy using Image Analogies", *Fifth Workshop on Biomedical Image Registration* (**WBIR**), 2012.

[5].Bo Wang, **Tian Cao**, Yuguo Dai, Dong C. Liu, "Ultrasound Speckle Reduction via Super Resolution and Nonlinear Diffusion", *the 9th Asian Conference on Computer Vision* (**ACCV**), 2009.

[6].**Tian Cao**, Bo Wang, Dong C. Liu, "Optimized GPU Framework of Semi-implicit AOS Scheme Based Speckle Reducing Nonlinear Diffusion", *proceedings of SPIE Medical Imaging* (**SPIE MI**), 2009.

[7].**Tian Cao**, Chaowei Tan, Dong C. Liu, "Adaptive Curve Region based Motion Estimation and Motion Visualization of Cardiac Ultrasound Imaging", *the 3rd International Conference on Bioinformatics and Biomedical Engineering* (**ICBBE**), 2009.

[8].**Tian Cao**, Xinyu Wu, Jinnian Guo, Shiqi Yu, Yangsheng Xu, "Abnormal Crowd Motion Analysis", *IEEE International Conference on Robotics and Biomimetics* (**ROBIO**), 2009.

Professional Skills

C/C++, Java, Matlab, Python, Bash, CUDA, OPENCV

Honors & Awards

Guanghua Scholarship.	2010
Outstanding graduate Student Award, Sichuan University.	2010
Graduate Student Fellowship, Sichuan University.	2007-2010
Student Innovation Award, Sichuan University.	2005-2007
1st prize of China Undergraduate Mathematical Contest in Modeling.	2006