

# TIAN CAO

100 Rock Haven Road  
APT E208  
Carrboro, NC 27510

(919) 699-9542 ☎  
[tiancao@cs.unc.edu](mailto:tiancao@cs.unc.edu) ✉  
[tiancao.me](http://tiancao.me) 🌐

## INTERESTS

Machine Learning, Image Analysis, Computer Vision

## EDUCATION

**University of North Carolina at Chapel Hill**, Chapel Hill, NC, USA 08/2010-present  
Ph.D. candidate in Computer Science  
**Sichuan University**, Chengdu, Sichuan, China 09/2007-06/2010  
M.S. in Computer Science  
**Sichuan University**, Chengdu, Sichuan, China 09/2003-05/2007  
B.E. in Computer Science

## EXPERIENCE

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

**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 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**, Christopher Zach, Marc Niethammer et al., “Multi-modal Registration for Correlative Microscopy using Image Analogies”, *Medical Image Analysis (MedIA)*, Elsevier, 2014.
- [2].**Tian Cao**, Vladimir Jovic, Marc Niethammer et al., “Robust Multimodal Dictionary Learning”, *The 16th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2013.
- [3].**Tian Cao**, Christopher Zach, Marc Niethammer et al., “Registration for Correlative Microscopy using Image Analogies”, *Fifth Workshop on Biomedical Image Registration (WBIR)*, 2012.
- [4].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.
- [5].**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, Vol. 7259, 2009.
- [6].**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)*, Vol. 3, pp. 453-457, 2009.
- [7].**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, ITK, VTK, OPENCV, CUDA, MFC

## SELECTED 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