Tian Cao

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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 Jojic, 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++, Python, Java, Matlab, 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