Curriculum Vitae
Zhennan Yan

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CONTACT

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EDUCATION

Ph.D. candidate in **Computer Science**, 09/2010 – present, GPA 3.97/4.00
Rutgers, the state University of New Jersey
Thesis: Robust Medical Image Segmentation and Recognition
Master of Science in **Computer Science**, 09/2006 - 03/2009
Shanghai Jiao Tong University (SJTU), Shanghai, China
Thesis: Fast Nonlinear Modeling and Application of Soft Tissue Deformation.
Bachelor of Engineering in **Software Engineering**, 09/2002 - 07/2006
Tongji University (TJU), Shanghai, China
Thesis: Application of Wavelets in Image Segmentation and Edge Detection.

RESEARCH INTERESTS

Medical image analysis
Machine learning/Deep learning
Computer vision

SKILLS

Programming: C++, Python, Java, C.
Graphics & Imaging: ITK/VTK, OpenCV
Numerical: Matlab.
Miscellany: Theano, Caffe, SVN, LATEX, CMake, Weka, QT, Microsoft Office, etc.

WORKING EXPERIENCE

Graduate Assistant, Computational Biomedicine Imaging and Modeling Center (CBIM), Rutgers University, 07/2012-present.
Core student member, Center for Dynamic Data Analytics (CDDA), NSF I/UCRC, 07/2012-present.
Intern Scientist, Siemens Healthcare, Syngo R&D US Division, 06-08/2015, 06-08/2014.
Intern Consultant, BioClinica Inc., 06/2013-08/2013.
Teaching Assistant, Computer Science, Rutgers University, 09/2010-05/2012.
Software Engineer, Galaxy Core Incorporated Company (Shanghai), 05/2009-07/2010.
Research Assistant, Lab of Image Guided Surgery and Therapy, SJTU. 09/2006-03/2009.
Intern Software Engineer, Intel Asia-Pacific Research & Development Ltd., 05/2008-08/2008.

SELECTED PROJECTS

Medical Image Recognition using Deep Learning (2014-present): Research work beginning at SYNGO R&D, Siemens Healthcare. Automated semantic understanding of medical images could be used in many CAD systems, e.g. anatomy localization, medical image classification, medical image retrieval, etc. We aimed to automatically recognize body parts in CT images in a classification setting. In our problem, the key challenging point is to automatically discover the discriminative local regions from globally similar images in different classes. We proposed and developed a novel convolutional neural network (CNN) based approach (Python+Theano), which uses multi-stage learning strategy to learn CNN in a multi-instance fashion. As a result, our 6-layer CNN can automatically discover discriminative local regions from training dataset, and the final performance is better than standard CNN with 10+ layers, e.g. CaffeNet.

Quantitative Tissue Assessment (2013 - present): CDDA projects with BioClinica Inc. Team leader. Design and develop automated algorithms (C++/Matlab) to segment & assess tissues in liver and thigh from volumetric MR scans. The segmentation algorithms include object/landmark detection, tissue classification (using clustering method and supervised learning, e.g. random

forest), graphical models, etc. With limited training samples and significant variations in clinical data, our fully automated methods are promising in terms of robustness and accuracy. Ongoing development efforts include further improvement of accuracy, efficiency and more extensive clinical validation to help clinical assessment of new therapies for diseases.

Human Brain Segmentation & Parcellation (2012 - 2014): CDDA projects with GE global research. Core member. Developed a non-stationary adaptive statistical model (combining spatial-variant Gaussian Mixture Model, markov random field in a EM optimization), which can be used in automated and simultaneous segmentation of 30+ anatomical structures in human brain (healthy or degenerative diseased) from volumetric MR scans. It achieved comparative or better accuracy with great speed up comparing with other leading methods.

Deception Recognition (2012 - 2013): Developed an automated, data-driven framework using visual cues to analyze interactional synchrony. This framework is able to automatically detect face and landmarks to track head gestures and facial expressions of both the interviewee and the interviewer, extract meaningful synchrony features (in temporal domain) and learn classification models for deception recognition.

3D Modeling (2006-2009): Research project in SJTU. Developed several 3D physical deformable models (e.g. including mass-spring, center-line, finite element model) for soft tissue simulation as a toolkit in C++ with GPU computation. It was applied in virtual surgery systems, e.g. a facial orthopedic surgery planning system.

PUBLICATIONS

[1] ***Z. Yan,*** *Y. Zhan, Z. Peng, S. Liao, Y. Shinagawa, S. Zhang, D. Metaxas, X. Zhou:* Multi-instance Deep Learning: Discover Discriminative Local Anatomies for Bodypart Recognition. IEEE Transactions on Medical Imaging, 2016.

[2] *C. Tan, K. Li,* ***Z. Yan****, D. Yang, H. J. Yu, K. Engelke, C. Miller, D. Metaxas:* A Data-driven and Sparsity-constrained Deformable Model for Fascia Lata Segmentation and Thigh Inter-muscular Adipose Quantification. Computer Vision and Image Understanding, 2016.

[3] *Y. Yu,* ***Z. Yan,*** *D. Metaxas, L. Axel:* Calibrationless Parallel Dynamic MRI with Joint Temporal Sparsity. MICCAI Workshop on Medical Computer Vision, 2015.

[4] ***Z. Yan,*** *Y. Zhan, Z. Peng, S. Liao, Y. Shinagawa, D. Metaxas, X. Zhou:* Bodypart recognition using multi-stage deep learning. The 24th biennial international conference on Information Processing in Medical Imaging (IPMI) 2015.

[5] *D. Yang, S. Zhang,* ***Z. Yan****, C. Tan, K. Li, D. Metaxas*: Automated Anatomical Landmark Detection on Distal Femur Surface Using Convolutional Neural Network. IEEE International Symposium on Biomedical Imaging (ISBI), 2015.

[6] *C. Tan,* ***Z. Yan****, K. Li, D. Metaxas, S. Zhang*: Laplacian Shape Editing with Local Patch Based Force Field for Interactive Segmentation. MICCAI Workshop on Patch-based Techniques in Medical Imaging, 2015.

[7] *C. Tan,* ***Z. Yan****, D. Yang, K. Li, H.J. Yu, K. Engelke, C. Miller, D. Metaxas*: Accurate Thigh Inter-muscular Adipose Quantification Using A Data-driven and Sparsity-constrained Deformable Model. ISBI 2015.

[8] ***Z. Yan****, S. Zhang, C. Tan, B. Belaroussi, H. Yu, C. Miller, Dimitris Metaxas:* Atlas-Based Liver Segmentation and Hepatic Fat-Fraction Assessment for Clinical Trials. Computerized Medical Imaging and Graphics. 2015.

[9] *X. Yu, S. Zhang,* ***Z. Yan****, F. Yang, J. Huang, N.E. Dunbar, M.L. Jensen, J.K. Burgoon and D.N. Metaxas:* Is Interactional Dissynchrony a Clue to Deception? Insights from Automated

Analysis of Nonverbal Visual Cues. IEEE Transactions on Cybernetics. 2014.

[10] ***Z. Yan****, S. Zhang, X. Liu, D. N. Metaxas, A. Montillo:* Accurate Whole-brain Segmentation for Alzheimer's Disease Combining An Adaptive Statistical Atlas and Multi-atlas. MICCAI Workshop on Medical Computer Vision, 2013.

[11] ***Z. Yan****, S. Zhang, X. Liu, D. N. Metaxas, A. Montillo:* Accurate Segmentation of Brain Images into 34 Structures Combining A Non-Stationary Adaptive Statistical Atlas and A Multi-atlas with Applications to Alzheimer's Disease. ISBI, 2013.

[12] *Y. Yu, S. Zhang,* ***Z. Yan****, S. Chen, R. Zhou, D. N. Metaxas*: Mouse LV 3D Motion and Strain Analysis using Tagged MRI. ISBI, 2013.

[13] *X. Yu, S. Zhang,* ***Z. Yan****, J. Huang, N. Dunbar, M. Jensen, J. K. Burgoon and D. N. Metaxas:* Is Interactional Dissynchrony a Clue to Deception: Insights from Automated Analysis of Nonverbal Visual Cues. 46th Hawaii International Conference on System Sciences, 2013.

[14] ***Z. Yan****, J. Zhang, S. Zhang, D. N. Metaxas:* Automatic Rapid Segmentation of Human Lung from 2D Chest X-Ray Images. MICCAI workshop on STMI, 2012.

[15] ***Z. Yan****, S. Zhang, S. Alam, D. N. Metaxas and E. Feleppa:* Modulus Reconstruction from Prostate Ultrasound Images using Finite Element Modeling. SPIE Medical Imaging, 2012.

[16] *S. Zhang, M. Uzunbas,* ***Z. Yan****, M. Gao, J. Huang, D. N. Metaxas and L. Axel:* Construction of Left Ventricle 3D Shape Atlas from Cardiac MRI. FIMH, 2011.

[17] *L. Pan, L. Gu,* ***Z. Yan****, S. Lv, B. Zhu*: An Improved Facial Orthopedic Surgery Planning System with Pre-processing FEM Modeling, IEEE 18th ICAT. 2008.

[18] *B. Zhu, L. Gu, J. Zhang,* ***Z. Yan****, L. Pan*: Simulation of Organ Deformation using Boundary Element Method and Meshless Shape Matching, 30th IEEE EMBS. 2008.

[19] *Y. Zou, P. Huang, L. Gu, J. Wu,* ***Z. Yan*** *and etc*.: Deformation modeling using global medial representation structures and evaluation by biset mesh matching, ICME. 2008.

[20] *P. Huang, L. Gu, J. Zhang, H. Zhou, D. He, X. Yu, J. Song,* ***Z. Yan,*** *etc*.: Real-time Deformable Modeling using Global Mass-Spring Medial Structure & Local FEM with Double-float GPU Acceleration. SPIE Medical Imaging 2008.

[21] ***Z. Yan****, L. Gu, P. Huang, S. Lv, X. Yu and X. Kong*: Soft Tissue Deformation Simulation in Virtual Surgery using Nonlinear Finite Element Method, 29th IEEE EMBS Conference.2007.

REFERENCES

Dimitris N. Metaxas, Professor & Chair of CS department
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Shaoting Zhang, Assistant Professor
Computer Science, University of North Carolina at Charlotte, Charlotte, NC
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