Xiaosong Wang, PhD

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EMPLOYMENT

Jul. 2015 – present	Postdoctoral Fellow
	CAD Lab, National Institutes of Health Clinical Center, Bethesda, USA
Dec. 2013 – Jun. 2015	Product Manager Post-processing Workstations
	HSW BU, Shanghai United Imaging Healthcare, Shanghai, CHINA
Sep. 2011 – Nov. 2013	CAD Dept. Manager / Tech Lead
	HSW BU, Shanghai United Imaging Healthcare, Shanghai, CHINA

EDUCATION

Oct. 2006 – Sep. 2011	UNIVERSITY OF BRISTOL, Bristol UK
	Ph.D in Computer Science
	Dissertation: Automatic Archive Film Restoration
Oct. 2005 – Sep. 2006	UNIVERSITY OF BRISTL, Bristol UK
	M.Sc in Computer Science
Sep. 2001 – Jun. 2005	HARBIN INSTITUTE OF TECHNOLOGY, Harbin CHINA
	B.Sc in Computational Mathematics

R&D PROJECTS

- **Weakly-Supervised Classification and Localization of Common Thorax Diseases (2016-2017)** Construct a new chest X-ray database, namely "ChestX-ray8", which comprises 108,948 frontal-view X-ray images of 32,717 unique patients with the text-mined eight disease image labels (where each image can have multi-labels), from the associated radiological reports using natural language processing. D Demonstrate that these commonly occurring thoracic diseases can be detected and even spatially-located via a unified weakly-supervised multi-label image classification and disease localization framework.
- **Lymph Node Segmentation (2016)** Develop a novel approach to segment lymph nodes by combining holistically nested neural networks and structured optimization (i.e. dense CRF, graph cuts, and a newly proposed matrix global optimization).
- **Unsupervised Image Category Discovery (2015-2016)** Develop a generic method using looped image representation learning and clustering to enable auto-annotation and category discovery from a large-scale image database.
- **Clinical Validation of post-processing applications (2012 - 2015)** Design and develop methods for validating the post-processing workstation produced in HSW BU, e.g. blinded validation in clinical studies, internal quantitative evaluation of the accuracy of algorithms. Workstations cross all modality are certificated by CFDA.
- **MR Breast CAD (2012-2013)** Develop a CADx module for MR breast Mass, including an interactive mass segmentation tool and mass kinetic analysis tools.
- **CT Lung Nodule CAD (2012-2013)** Develop a CADe module for automatic CT lung Nodule detection, involving nodule enhancement, nodule segmentation, feature calculation / selection, LDA based nodule classification, for both solid and GGO nodules.
- **CT Colonoscopy (2012-2013)** Develop a tool for processing CT colonoscopy images, involving colon segmentation, cleansing, central line extraction, polyp segmentation, feature calculation/extraction, SVM based polyp classification
- **FFDM Mass/Calcification CAD (2013)** Develop a tool for automatic detection of mass and calcification in FFDM, involving breast segmentation, pectoralis removal, background suppression, mass/calcification segmentation, feature calculation/selection, LDA based mass/calcification classification
- **MI Cardiac Perfusion (2013)** Develop a tool for processing PET/SPECT Cardiac Perfusion images, involving SA view reconstruction, LV segmentation, Bull's eye polar map calculation.
- **Resting-state fMRI (2013)** Develop a tool for processing resting-state fMRI data with ICA and seeded region based analysis methods. Collaboration with Shanghai Xuhui District Hospital in a clinical migraine study (data mining the relationship between migraine and fMRI resting-state components)

- **DBT / CBCT / Synthesis 2D Image Reconstruction (2013)** Develop FBP and iterative algorithms for DBT/CBCT tomography reconstruction from projection data, including FBP, BPF, MLEM, etc.
- **CT Liver Perfusion (2012)** Develop a method for processing CT liver perfusion data, involving artery localization, bone removal, dual-input single-compartment modeling (kinetic analysis), computing functional maps.
- **MR BOLD (2012)** C++ implementation of SPM and an inline version for real-time scan controlling.
- **MR Auto-Windowing (2011)** Develop an automatic windowing method for MR images, involving feature calculation, SOM/adaptive k-means classification, RBF windowing training, online training.
- **Automatic Archive Film Restoration (2006-2011)** Develop a unified framework for automatic archive film restoration, which is composed of three parts, i.e. defect detection, false alarm elimination and defect removal. First, we propose a novel probabilistic approach to detect defects in digitized archive film, by combining temporal and spatial information across a number of frames. A two-stage false alarm elimination process is then applied on the resulting defect maps, comprising MRF modelling and localized feature tracking. Given the resulting defect maps, restoration is performed for defects and missing regions in archive films. The proposed statistical framework is based on random walks to examine the spatiotemporal path of a degraded pixel, and uses texture features in addition to intensity and motion information traditionally used in previous restoration works.
- **A SIFT Tool (2006)** The aim of this project is to produce a fully comprehensive software library which implements previous work by David G. Lowe on the subject of the Scale Invariant Feature Transform (SIFT). The SIFT library is critically evaluated and demonstrated by using images under different transformations and an object recognition system.

DISTINCTIONS

Nov. 2016	RSNA 2016 Trainee Research Award
Aug. 2016	NIH Fellows Award for Research Excellence (FARE)
Sep. 2010	ECCV Student Travel Award
Sep. 2009	Best Industrial Paper Prize, BMVC 2009
Oct. 2006 – Sep. 2009	Great Western Research PhD scholarship, UK
Sep. 2006	Msc thesis with Distinction (top 5%)
Jul. 2005	Bsc thesis with Distinction (100 among over 5600 graduates)

SERVICES

Reviewer   Pattern Analysis and Application, Pattern Recognition, Medial Image Analysis, IEEE Transactions on Biomedical Engineering, Journal of Biomedical Informatics, IET Computer Vision, IEEE Transactions on Medical Imaging, Neurocomputing, Knowledge-Based Systems

PEER-REVIEWED PUBLICATIONS

[8] **X. Wang**, Y. Peng, L. Lu, Z. Lu, M. Bagheri, R. Summers. ChestX-ray8: Hospital-scale Chest X-ray Database and Benchmarks on Weakly-Supervised Classification and Localization of Common Thorax Diseases. IEEE CVPR, 2017 (spotlight)

[7] Y. Tsehay, N. Lay, **X. Wang**, B. Turkbey, J. T. Kwak, P. Choyke, P. Pinto, B. Wood, R. Summers. Weakly Supervised Learning with Deep Convolutional Neural Networks for Prostate Cancer Detection on Multiparametric MRI. ISBI, 2017

[6] **X. Wang**, L. Lu, H. Shin, L. Kim, M. Bagheri, I. Nogues, J. Yao, R. M. Summers. Unsupervised Joint Mining of Deep Features and Image Labels for Large-scale Radiology Image Annotation and Scene Recognition. WACV, 2017

[5] I. Nogues, L. Lu, **X. Wang**, H. Roth, G. Bertasius, N. Lay, J. Shi, Y. Tsehay, R. M. Summers. Automatic Lymph Node Cluster Segmentation using Holistically-Nested Networks and Structured Optimization. MICCAI, 2016

[4] **X. Wang** and M. Mirmehdi. Archive Film Defect Detection and Removal: an Automatic Restoration Framework. IEEE Transactions on Imaging Processing (T-IP 2012), 21(8):3757-3769, March 2012.

[3] **X. Wang** and M. Mirmehdi. Archive Film Restoration based on Spatiotemporal Random Walks. In Proceedings of the 11th European Conference on Computer Vision (ECCV 2010), September 2010.

[2] **X. Wang** and M. Mirmehdi. HMM based Archive Film Defect Detection with Spatial and Temporal constraints. In Proceedings of the 20th British Machine Vision Conference (BMVC 2009), Winner of the Best Industrial Paper Prize, September 2009.

[1] **X. Wang** and M. Mirmehdi. Archive Film Defect Detection based on a Hidden Markov Model. In Proceedings of the 10th International Workshop on Image Analysis for Multimedia Interactive Services (WIAMIS 2009), May 2009.

ABSTRACTS AND TECH REPORTS

[4] Y. Tsehay, N. Lay, H. Roth, **X. Wang**, J. T. Kwak, B. Turkbey, P. Pinto, B. Wood, R. Summers. Convolutional neural network based deep-learning architecture for prostate cancer detection on multiparametric magnetic resonance images. SPIE Medical Imaging, 2017

[3] I. Nogues, L. Lu, **X. Wang**, H. Roth, G. Bertasius, N. Lay, J. Shi, Y. Tsehay, R. M. Summers: Automatic Lymph Node Cluster Segmentation Using Holistically-Nested Deep Convolutional Neural Networks and Structured Optimization in CT Images. RSNA abstract, 2016

[2] **X. Wang**, L. Lu, H. Shin, L. Kim, I. Nogues, J. Yao, R. M. Summers: Automated Annotation of a Large Scale Radiology Image Database Using Deep Learning. RSNA abstract, 2016.

[1] **X. Wang**, L. Lu, H. Shin, L. Kim, I. Nogues, J. Yao, R. M. Summers: Unsupervised Category Discovery via Looped Deep Pseudo-Task Optimization Using a Large Scale Radiology Image Database. arXiv:1603.07965, 2016.

PATENTS

[9] L. Lu, **X. Wang**, R. M. Summers: Category Discovery and Image Auto-annotation via looped Deep Pseudo-task Optimization. US Patent Application, 62/302,096, 2016

[8] L. Lu, H. Roth, I. Nogues, R. M. Summers, **X. Wang**: Integrating Deep Boundary and Appearance Convolutional Neural Networks for Bottom-up Organ Segmentation. US Patent Application, 62/345,606, 2016

[7] L. Wang, **X. Wang**: Heart model building method, heart model registration and heart multi-plane reconstruction method. Chinese Patent Application, SIPO application Number: 201410134502, 2014

[6] H. Li, H. Shi, **X. Wang**: Pectoralis segmentation method in breast image. Chinese Patent, SIPO: 201410028053, 2014

[5] H. Li, **X. Wang**: Region real-time segmentation method for medical image. Chinese Patent Application, SIPO application Number: 201310296542, 2013

[4] Z. Chen, **X. Wang**, C. Qiu: Image processing method and image processing device. Chinese Patent Application, SIPO application number: 201310442712, 2013

[3] **X. Wang**: Simulation method and quantitative test method of liver perfusion. Chinese Patent Application, SIPO application number: 201210588049, 2012

[2] **X. Wang**: CT liver-perfusion image post-processing method and CT liver-perfusion method. Chinese Patent Application, SIPO application number: 201210480285, 2012

[1] Y. Fei, **X. Wang**, C. Li: Automatic window width and window level extraction method based on neural network. Chinese Patent Application, SIPO application number: 201210071683, 2012