

# Mingchen Gao

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## RESEARCH INTERESTS

Big Healthcare Data, Biomedical Imaging Informatics, Machine Learning, Computer Vision

## EDUCATION

- 09/2007 – 06/2014 **Rutgers University**, New Brunswick, NJ  
Ph.D. in Computer Science  
Thesis: Cardiac Reconstruction and Analysis from High Resolution CT Images  
Advisor: Prof. Dimitris Metaxas
- 09/2003 – 06/2007 **Southeast University**, Nanjing, China  
**Chien-Shiung Wu College (Gifted Young Class)**  
B.E. in Computer Science and Engineering

## EMPLOYMENTS

- 08/2017 – present **Assistant Professor**, Department of Computer Science and Engineering  
University at Buffalo, SUNY
- 09/2014 – 08/2017 **Postdoctoral Fellow**, Center for Infectious Disease Imaging  
Department of Radiology and Imaging Sciences, Clinical Center  
National Institutes of Health (NIH), Bethesda, MD
- 07/2009 – 06/2014 **Research Assistant**, Rutgers University, Computer Science Department  
New Brunswick, NJ
- 03/2013 – 08/2013 **Research Intern**, Siemens Medical Solution, Malvern, PA
- 05/2012 – 08/2012 **Software Engineer Intern**, Google Inc., Image Search Group, Mountain View, CA
- 09/2007 – 06/2009 **Teaching Assistant**, Rutgers University, Computer Science Department,  
New Brunswick, NJ

## FUNDING

- Artificial Intelligence Germination Space Program, University at Buffalo, SUNY 09/01/18-08/31/19  
AI Drug Discovery to Characterise and Treat Every Disease \$25,000  
Role: Co-PI

## STUDENT ADVISING

### PhD Students

Yan Shen	01/2018 - present
Chunwei Ma	08/2018 - present
Zhanghexuan Ji	08/2018 - present

### MS Students

Congying Wang	01/2018 - present
Jun Zhuang	09/2017 - 05/2018 now IUPUI PhD student
Jihai Xu	09/2017 - 05/2018 now Amazon Software Engineer

### PhD Committee Membership

Runpu Chen
Lu Li
Le Yang
Ying Lu (Department of Geography)

### Qualify Exam Committee Membership

Nishant Sankaran	03/2018
Fathi Razie	03/2018
Zheshuo Li	05/2018

## TEACHING

CSE703 Deep Learning for Visual Recognition with Applications to Medical Imaging Analysis	Fall 2017, 2018
CSE574 Introduction to Machine Learning	Spring 2018

## HONORS AND AWARDS

2017	Fellows Award for Research Excellence (FARE) Award by NIH
2014-2016	NIH Imaging Sciences Training Program (ISTP) Fellowship
2013	IPMI Scholarship for Junior Researchers
2011	Best Paper Award at the 6th Conference on Functional Imaging and Modeling of the Heart
2007	Excellent Bachelor Degree Thesis of Southeast University
2005	University Distinguished Student Award of Southeast University
2004,2005	Outstanding Student Fellowship of Southeast University
2001	Enrolled in Gifted Young Class of Suzhou Middle School (Finished 3-year program in 2 years)

## PUBLICATIONS

978 citations, H-index 11 according to google scholar  
 5 peer-reviewed journals, 15 peer-reviewed conference papers, 4 peer-reviewed workshop papers, 2 patents  
 Students I supervised at UB are marked with \*

### Dissertation

1. **Mingchen Gao**. Cardiac reconstruction and analysis from high resolution CT images, Doctoral dissertation, Rutgers University, 2014.

### Book Chapters

2. Dimitris Metaxas, Scott Kulp, **Mingchen Gao**, Shaoting Zhang, Zhen Qian, and Leon Axel. Segmentation and blood flow simulations of patient-specific heart data. In *Computational Surgery and Dual Training*, pages 213–240. Springer, New York, NY, 2014
3. **Mingchen Gao**, Ziyue Xu, and Daniel J Mollura. Interstitial lung diseases via deep convolutional neural networks: Segmentation label propagation, unordered pooling and cross-dataset learning. In *Deep Learning and Convolutional Neural Networks for Medical Image Computing*, pages 97–111. Springer, Cham, 2017
4. Hoo-Chang Shin, Holger R Roth, **Mingchen Gao**, Le Lu, Ziyue Xu, Isabella Nogues, Jianhua Yao, Daniel Mollura, and Ronald M Summers. Three aspects on using convolutional neural networks for computer-aided detection in medical imaging. In *Deep Learning and Convolutional Neural Networks for Medical Image Computing*, pages 113–136. Springer, Cham, 2017

#### Peer-reviewed Journal Papers

5. [MedIA'18] Ziyue Xu, **Mingchen Gao**, Georgios Z Papadakis, Brian Luna, Sanjay Jain, Daniel J Mollura, and Ulas Bagci. Joint solution for pet image segmentation, denoising, and partial volume correction. *Medical image analysis*, 46:229–243, 2018
6. [Tomography'17] Mario Buty, Ziyue Xu, Aaron Wu, **Mingchen Gao**, Chelyse Nelson, Georgios Z Papadakis, Uygur Teomete, Haydar Celik, Baris Turkbey, Peter Choyke, et al. Quantitative image quality comparison of reduced-and standard-dose dual-energy multiphase chest, abdomen, and pelvis CT. *Tomography: a journal for imaging research*, 3(2):114, 2017
7. [TMI'16] Shin Hoo-Chang, Holger R Roth, **Mingchen Gao**, Le Lu, Ziyue Xu, Isabella Nogues, Jianhua Yao, Daniel Mollura, and Ronald M Summers. Deep convolutional neural networks for computer-aided detection: CNN architectures, dataset characteristics and transfer learning. *IEEE transactions on medical imaging*, 35(5):1285, 2016
8. [CMBBE'16] **Mingchen Gao**, Ulas Bagci, Le Lu, Aaron Wu, Mario Buty, Hoo-Chang Shin, Holger Roth, Georgios Z Papadakis, Adrien Depeursinge, Ronald M Summers, et al. Holistic classification of CT attenuation patterns for interstitial lung diseases via deep convolutional neural networks. 2016
9. [CVIU'13] Shaoting Zhang, Yiqiang Zhan, Xinyi Cui, **Mingchen Gao**, Junzhou Huang, and Dimitris Metaxas. 3D anatomical shape atlas construction using mesh quality preserved deformable models. *Computer Vision and Image Understanding*, 117(9):1061–1071, 2013

#### Peer-reviewed Conference Papers

10. [MICCAI'16] Mario Buty, Ziyue Xu, **Mingchen Gao**, Ulas Bagci, Aaron Wu, and Daniel J Mollura. Characterization of lung nodule malignancy using hybrid shape and appearance features. In *International Conference on Medical Image Computing and Computer-Assisted Intervention*, pages 662–670. Springer, Cham, 2016 (acceptance rate  $\sim 30\%$ )
11. [ISBI'16a] **Mingchen Gao**, Ziyue Xu, Le Lu, Aaron Wu, Isabella Nogues, Ronald M. Summers, and Daniel J. Mollura. Segmentation label propagation using deep convolutional neural networks and dense conditional random field. In *2016 IEEE 13th International Symposium on Biomedical Imaging (ISBI)*, pages 1265–1268. IEEE, 2016
12. [ISBI'16b] Aaron Wu, Ziyue Xu, **Mingchen Gao**, Mario Buty, and Daniel J Mollura. Deep vessel tracking: A generalized probabilistic approach via deep learning. In *2016 IEEE 13th International Symposium on Biomedical Imaging (ISBI)*, pages 1363–1367. IEEE, 2016

13. [ISBI'15a] Ziyue Xu, Ulas Bagci, **Mingchen Gao**, and Daniel J Mollura. Highly precise partial volume correction for pet images: An iterative approach via shape consistency. In *Biomedical Imaging (ISBI), 2015 IEEE 12th International Symposium on*, pages 1196–1199. IEEE, 2015 (**Oral Presentation**, acceptance rate 18%)
14. [ISBI'15b] Sheng Huang, **Mingchen Gao**, Dan Yang, Xiaolei Huang, Ahmed Elgammal, and Xiaohong Zhang. Unbalanced graph-based transduction on superpixels for automatic cervicogram image segmentation. In *Biomedical Imaging (ISBI), 2015 IEEE 12th International Symposium on*, pages 1556–1559. IEEE, 2015 (**Oral Presentation**, acceptance rate 18%)
15. [ISBI'14a] **Mingchen Gao**, Chao Chen, Shaoting Zhang, Zhen Qian, Mani Vannan, Sarah Rinehart, Dimitris Metaxas, and Leon Axel. Morphological analysis of the papillary muscles and the trabeculae. In *Biomedical Imaging (ISBI), 2014 IEEE 11th International Symposium on*, pages 373–376. IEEE, 2014
16. [ISBI'14b] **Mingchen Gao**, Yiqiang Zhan, Gerardo Hermosillo, Yoshihisa Shinagawa, Dimitris Metaxas, and Xiang Sean Zhou. Saliency-based rotation invariant descriptor for wrist detection in whole body ct images. In *Biomedical Imaging (ISBI), 2014 IEEE 11th International Symposium on*, pages 117–120. IEEE, 2014
17. [IPMI'13] **Mingchen Gao**, Chao Chen, Shaoting Zhang, Zhen Qian, Dimitris Metaxas, and Leon Axel. Segmenting the papillary muscles and the trabeculae from high resolution cardiac ct through restoration of topological handles. In *International Conference on Information Processing in Medical Imaging*, pages 184–195. Springer, Berlin, Heidelberg, 2013 (acceptance rate 32%)
18. [ISBI'13a] **Mingchen Gao**, Rui Shi, Shaoting Zhang, Wei Zeng, Zhen Qian, Xianfeng David Gu, Dimitris Metaxas, and Leon Axel. High resolution cardiac shape registration using ricci flow. In *Biomedical Imaging (ISBI), 2013 IEEE 10th International Symposium on*, pages 488–491. IEEE, 2013
19. [ISBI'13b] Lin Zhong, Shaoting Zhang, **Mingchen Gao**, Junzhou Huang, Zhen Qian, Dimitris Metaxas, and Leon Axel. Papillary muscles analysis from high resolution ct using spatial-temporal skeleton extraction. In *Biomedical Imaging (ISBI), 2013 IEEE 10th International Symposium on*, pages 820–823. IEEE, 2013
20. [ISBI'13c] Scott Kulp, **Mingchen Gao**, Shaoting Zhang, Zhen Qian, Szilard Voros, Dimitris Metaxas, and Leon Axel. Practical patient-specific cardiac blood flow simulations using sph. In *Biomedical Imaging (ISBI), 2013 IEEE 10th International Symposium on*, pages 832–835. IEEE, 2013
21. [MICCAI'12] **Mingchen Gao**, Junzhou Huang, Xiaolei Huang, Shaoting Zhang, and Dimitris N Metaxas. Simplified labeling process for medical image segmentation. In *International Conference on Medical Image Computing and Computer-Assisted Intervention*, pages 387–394. Springer, Berlin, Heidelberg, 2012 (acceptance rate 32%)
22. [FIMH'11a] **Mingchen Gao**, Junzhou Huang, Shaoting Zhang, Zhen Qian, Szilard Voros, Dimitris Metaxas, and Leon Axel. 4d cardiac reconstruction using high resolution ct images. In *International Conference on Functional Imaging and Modeling of the Heart*, pages 153–160. Springer, Berlin, Heidelberg, 2011 (**Oral Presentation, Best Paper Award**)
23. [FIMH'11b] Shaoting Zhang, Mustafa Uzunbas, Zhennan Yan, **Mingchen Gao**, Junzhou Huang, Dimitris N Metaxas, and Leon Axel. Construction of left ventricle 3d shape atlas from cardiac mri. In *International Conference on Functional Imaging and Modeling of the Heart*, pages 88–94. Springer, Berlin, Heidelberg, 2011 (acceptance rate 26%)

24. [MICCAI'11] Scott Kulp, **Mingchen Gao**, Shaoting Zhang, Zhen Qian, Szilard Voros, Dimitris Metaxas, and Leon Axel. Using high resolution cardiac ct data to model and visualize patient-specific interactions between trabeculae and blood flow. In *International Conference on Medical Image Computing and Computer-Assisted Intervention*, pages 468–475. Springer, Berlin, Heidelberg, 2011 (acceptance rate  $\sim 30\%$ )

#### Peer-reviewed Workshop Papers

25. [MLMI'18] Yan Shen\* and **Mingchen Gao**. Dynamic routing on deep neural network for thoracic disease classification and sensitive area localization. In *International Workshop on Machine Learning in Medical Imaging*, pages 389–397. Springer, 2018
26. [BrainLes'18] Yufan Zhou\*, Zheshuo Li\*, Hong Zhu, Changyou Chen, **Mingchen Gao**, Kai Yu, and Jinhui Xu. Holistic brain tumor screening and classification based on densenet and recurrent neural network. In *Brainlesion: Glioma, Multiple Sclerosis, Stroke and Traumatic Brain Injuries*, 2018
27. [MLMI'16] **Mingchen Gao**, Ziyue Xu, Le Lu, Adam P Harrison, Ronald M Summers, and Daniel J Mollura. Multi-label deep regression and unordered pooling for holistic interstitial lung disease pattern detection. In *International Workshop on Machine Learning in Medical Imaging*, pages 147–155. Springer, Cham, 2016
28. [MeshMed'12] Xinyi Cui, Shaoting Zhang, Yiqiang Zhan, **Mingchen Gao**, Junzhou Huang, and Dimitris N Metaxas. 3d anatomical shape atlas construction using mesh quality preserved deformable models. In *Workshop on Mesh Processing in Medical Image Analysis*, pages 12–21. Springer, Berlin, Heidelberg, 2012 (**Oral Presentation**)

#### Peer-reviewed Abstracts

29. [RSNA'16a] **Mingchen Gao**, Ziyue Xu, Le Lu, Adam P. Harrison, Ronald M. Summers, Daniel J. Mollura, Multi-label Deep Convolutional Neural Networks for Holistic Interstitial Lung Disease Detection, Annual Meeting of the Radiological Society of North America, December 2016
30. [RSNA'16b] **Mingchen Gao**, Ziyue Xu, Le Lu, Aaron Wu, Isabella Noguez, Ronald M. Summers, Daniel J. Mollura, Segmentation Label Propagation using Deep Convolutional Neural Networks and Dense Conditional Random Field, Annual Meeting of the Radiological Society of North America, December 2016
31. [SNMMI'15] Ziyue Xu, Ulas Bagci, **Mingchen Gao**, Daniel J. Mollura, Improved PET image quantification via iterative denoising and partial volume correction, Annual Meeting of the Society of Nuclear Medicine and Molecular Imaging, June 2015
32. [RSNA'15] Ziyue Xu, **Mingchen Gao**, Ulas Bagci, Daniel J. Mollura, Recent Advances in Techniques for PET Image Denoising and Partial Volume Correction, Annual Meeting of the Radiological Society of North America, December 2015

#### Patents, Invention Records

33. Sub-Query Evaluation for Image Search, Kunlong Gu, Charles J. Rosenberg, **Mingchen Gao**, Thomas J. Duerig, granted, US9152652B2, 10/06/2015. (Google Inc.)
34. Detection of Arbitrarily Rotated Anatomies using Rotation-invariant Salient Configurations. **Mingchen Gao**, Yiqiang Zhan, Gerardo Hermosillo, Yoshihisa Shinagawa, Xiang Sean Zhou, Invention disclosure, 2013. (Siemens Medical Solutions)

## PRESENTATIONS

- Advancing Disease Diagnosis via Learning from Radiology Images, Michigan State University (March 2016), University at Buffalo (December 2016), the University of Texas at Arlington (March 2017), University of Maryland, Baltimore County (April 2017)
- Unbalanced Graph-Based Transduction on Superpixels for Automatic Cervigram Image Segmentation, ISBI, New York, USA, April 2015.
- 4D Cardiac Reconstruction and Applications, Siemens Medical Solutions, Malvern, PA, USA, November 2012.
- 3D Anatomical Shape Atlas Construction Using Mesh Quality Preserved Deformable Models, MeshMed, Nice, France, October 2012.
- Fluid Flow Analysis for Cardiovascular Diagnostics, Center for Dynamic Data Analytics (CDDA), Stony Brook University, Stony Brook, NY, with Scott Kulp, May 2012.
- 4D Cardiac Reconstruction Using High Resolution CT Images, FIMH, New York, USA, May 2011.

## PROFESSIONAL ACTIVITIES

Reviewer:

IEEE Transactions on Medical Imaging  
Medical Physics  
Journal of Medical Imaging  
Neurocomputing  
Information Sciences  
Signal Processing  
Computer Vision and Image Understanding  
IEEE Transactions on Vehicular Technology  
Medical Image Computing and Computer Assisted Intervention (MICCAI'12, 13, 14, 15, 16, 17)  
International Symposium on Biomedical Imaging (ISBI'13, 14, 15)  
IEEE International Conference on Multimedia & Expo (ICME'14)  
MICCAI workshop on Sparsity Techniques in Medical Imaging (STMI'12)