Yucheng Tang

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Nvidia Corporation, Redmond, WA, U.S.
Vanderbilt University, Nashville, TN, U.S.

Education

08/2018---06/2022: Vanderbilt University, *TN, U.S.*
Major: Electrical Engineering Degree: Ph.D.

08/2016---05/2018: New York University, *NY, U.S.*
Major: Computer Science Degree: Master of Science

09/2011---07/2015: Tianjin University, *Tianjin, China*
Major: Electrical Engineering and Automation Degree: Bachelor of Engineering

Academic Positions

06/2020 – Present **Instructor & Affiliated Teaching Member**, Vanderbilt University, Nashville, TN.
Course: CS1104, Department of Computer Science.

07/2018 – 06/2022 **Graduate Research &Teaching Assistant**, Vanderbilt University, Nashville, TN.
Medical-image Analysis and Statistical Interpretation Lab, Advisor: Dr. Bennett A. Landman.

Research Interests

07/2018 – Present Medical Image Analysis, Machine Learning, Biomedical Data Representation, Computer Vision

Research Employments

07/2022 – present **Applied Research Scientist**, Nvidia Research, *Redmond, WA, U.S.*
Supervisor: Dr. Daguang Xu

- Major contributor at Project MONAI Label, an intelligent open-source image labeling and learning tool that enables users to create annotated datasets and build AI annotation models for clinical evaluation. MONAI Label enables application developers to build labeling apps in a serverless way.
- State-of-the-art research: self-supervised learning, 3D medical segmentation, multi-modal transformer, endoscopy tool detection, multi-instance learning, and collaborative learning with healthcare data.

06/2021 – 09/2021 **Applied Research Intern**, Nvidia Research, *Santa Clara, CA, U.S.* (Remote)
Supervisor: Dr Holger Roth, Dr. Daguang Xu

- Deployed Large scale pre-training for medical image analysis. Designed Swin-UNETR achieved 11 benchmarks top 1 performance in leaderboards. Model released in MONAI public framework. Developed Clara Train SDK toolkit and AI-assisted annotation
- Developed Transformer-based volumetric medical image analysis (UNETR) achieved state-of-the-art at MSD challenge and top 1 ranking at leaderboard, toolkit and model released in MONAI and product to appear in Nvidia GTC 2021.

07/2018 – present **Research Assistant**, Vanderbilt Institute of Surgery and Engineering, *Nashville, TN U.S.*
Supervisor: Dr. Bennett A. Landman

- Led research in robust deep learning algorithms (e.g., outlier-robust learning via meta parameterization, active learning) for clinically translational research.
- Developed methods on reducing human efforts in automatic labeling (e.g., semi-supervised learning via quality assessments, partially-supervised segmentation, self-supervision). Our methods are used for doctor and hospitals with large scale clinical data on daily basis.

06/2017 – 05/2018 **Research Intern**, SIEMENS Healthineers, *Princeton, NJ, U.S.*
Supervisor: Dr. Kevin S. Zhou

- Developed an adversarial deep image-to-image neural network for organ segmentation: training with 1000+ annotated 3D CT images (heart, liver, spleen, kidneys); training with 5000+ annotated 3D CT images. They save the radiologist 70% annotation time.
- Developed collaborative volume completion and contour detection system For Intracardiac. Algorithm achieved cross-modality cardiac segmentation and integrated to SIEMENS Ultrasound systems.

02/2017 – 06/2017 **Research Assistant**, New York University. *New York City, U.S*
Supervisor: Dr. Ivan Selesnick

Awards

2020 SPIE Medical Imaging RFW Best Paper Award (finalist)
2020 SPIE Image Processing Best Poster Award (coauthor)
2020 SPIE Image Processing Best Student Paper Award (coauthor)
2019 IBM Graduate Fellow, Vanderbilt University
2014 "Excellent Student Cadre", Tianjin University

Teaching Experience

2020 **DS 5660: Machine Learning**, Vanderbilt University.
Guest Instructor
2020 **CS 1104: Programming and Problem Solving with Python**, Vanderbilt University.
Instructor
2020 **CS 8395: Deep Learning in Medical Image Computing**, Vanderbilt University.
Lecturer
2019 **Vanderbilt Summer Research Programs**, Vanderbilt University.

Publications and Patents

Journal

1. **Y. Tang**, R. Gao, S. Han, Y. Chen, D. Gao, V. Nath, C. Bermudez, M. R. Savona, R. G. Abramson, S. Bao, I. Lyu, Y. Huo and B. A. Landman, "Body Part Regression with Self-supervision", *IEEE Transactions on Medical Imaging*, 2020.
2. **Y Tang,** R. Gao, S. Han, Y. Chen, D. Gao, V. Nath, C. Bermudez, M. R. Savona, R. G. Abramson, S. Bao, I. Lyu, Y. Huo and B. A. Landman, "High-resolution 3D Abdominal Segmentation with Random Patch Network Fusion", *Medical Image Analysis*, 2020.
3. R. Gao, **Y. Tang**, K. Xu, Y. Huo, S. Bao, S. L. Antic, E. S. Epstein, S. Deppen, A. B. Paulson, K. L. Sandler, P. P. Massion, and B. A. Landman, "Time-Distanced Gates in Long Short-Term Memory Networks", *Medical Image Analysis*, 2020.
4. M. He, J. R. Nolen, J. Nordlander, A. Cleri, N. S. Mcllwaine , **Y. Tang**, G. Lu, T. G. Folland, B. A. Landman, J. P. Maria, J. D. Caldwell, "Deterministic inverse design of Tamm plasmon thermal emitters with multi-resonant control", *Nature Material*, 2021.
5. **Y. Tang**, S. Bao, R. Gao, C. Mathurin, H. H. Lee, X. Yu, V. Nath, B. V. Savoie, Y. Huo, Z. Xu, R. Harris, M.

P. de Caestecker, J. M. Spraggins, A. B. Fogo, and B. A. Landman, "Automatic Segmentation of the Renal Cortex, Medulla and Pelvicalyceal System with Deep Neural Networks: Assessment of Quantitative Measurements and Reproducibility", *Radiology: Artificial Intelligence*, 2021.

6. R. Gao, **Y. Tang**, M. S. Khan, K. Xu, A. B. Paulson, S. Sullivan, Y. Huo, S. Deppen, P. P. Massion, K. L. Sandler, and B. A. Landman, "Validation of Cancer Risk Estimation Combining Lung Screening CT with Clinical Data Elements", *Radiology*, *Artificial Intelligence*, 2021.
7. **Y. Tang**, R. Gao, H. H. Lee, Y. Chen, D. Gao, C. Bermudez, S. Bao, Y. Huo, B. V. Savoie and B. A. Landman, "Phase Identification for Dynamic CT enhancements with Generative Adversarial Network", *Medical Physics*, 2020.
8. R. Gao, **Y. Tang,** Y. Huo, S. Bao, S. L. Antic, E. S. Epstein, S. Deppen, A. B. Paulson, K. L. Sandler, P. P. Massion, B. A. Landman, "Multi-path xD recurrent neural networks for collaborative image classification", *Neurocomputing*, 2020
9. **Y. Tang,** R. Gao, Y. Chen, D. Gao, M. R. Savona, R. G. Abramson, S. Bao, Y. Huo and B. A. Landman, "Learning from Dispersed Manual Annotations with an Optimized Data Weighting Policy", *Journal of Medical Imaging*, 2020.
10. Y. Huo, **Y. Tang**, Yunqiang Chen, D. Gao, S. Han, N. Zhou, S. Bao, S. De, J. G. Terry, J. J. Carr, R. G Abramson, and B. A. Landman, "Stochastic Tissue Window Normalization of Deep Learning on CT ", *Journal of Medical Imaging,* 2019.
11. Y. Yang, **Y. Tang***, R. Gao, S. Bao, Y. Huo, M. T. McKenna, M. R. Savona, R. G. Abramson, and B. A. Landman, "Validation and Estimation of Spleen Volume Via Computer-assisted Segmentation on Clinically Acquired CT scans", *Journal of Medical Imaging*, 2021.

Selective Conference

1. **Y. Tang**, D. Yang, W. Li, H. Roth, B. A. Landman, D. Xu, V. Nath, A. Hatamizadeh, "Large Scale Self-Supervised Pre-Training of Transformers for Medical Image Analysis", CVPR 2022.
2. A. Hatamizadeh**, Y. Tang***, V. Nath, D. Yang, A. Myronenko, B. A. Landman, H. Roth, D. Xu, "UNETR: Transformers for 3D Medical Image Segmentation", WACV 2021.
3. **Y. Tang**, R. Gao, H. H. Lee, Q. Yang, X. Yu, Y. Zhou, S. Bao, Y. Huo, J. Spraggins, J. Virostko, Z. Xu, B. A. Landman. "*Pancreas CT Segmentation by Predictive Phenotyping*". International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2021.
4. R. Gao, **Y. Tang**, K. Xu, H. H. Lee, S. Deppen, K. Sandler, P. Massion, T. Lasko, Y. Huo, B. A, Landman. *Lung Cancer Risk Estimation with Incomplete Data: A Joint Missing Imputation Perspective*. International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI) 2021.
5. H. H. Lee, **Y. Tang**, S, Bao, M. R. Savona, R. G. Abramson, Y. Huo, and B. A. Landman, "Hierarchical Coarse-to-Fine Abdominal Multi-Organ Segmentation with Single Refine Anatomical Prior Context Model", *IEEE ISBI*, 2021.
6. **Y. Tang**, H. H. Lee, Y. Xu, O. Tang, Y. Chen, D. Gao, S. Han, R. Gao, C. Bermudez, M. R. Savona, R. G. Abramson, Y. Huo, B. A. Landman, "Contrast Phase Classification with a Generative Adversarial Network", *SPIE IP:MI,* 2020. (Spotlight)
7. **Y. Tang,** R. Gao, H. H. Lee, Q. S. Wells, A. Spann, J. G. Terry, J. C., Y. Huo, S. Bao and B. A. Landman, "Prediction of Type II Diabetes Onset with Computed Tomography and Electronic Medical Records", *MICCAI,* 2020.
8. L. Hao, S. Bao, **Y. Tang**, R. Gao, P. Parvathaneni, J. A. Miller, W. Voorhies, J. Yao, S. A. Bunge, K. S. Weiner, B. A. Landman, and I. Lyu, "Automatic Labeling of Cortical Sulci using Convolutional Neural Networks in a Developmental Cohort", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2020
9. R. Gao, L. Li, Y. Huo, **Y. Tang**, S. L. Antic, E. S. Epstein, S. Deppen, A. B. Paulson, K. L. Sandler, P. P. Massion, and B. A. Landman, "Deep Multi-task Prediction of Lung Cancer and Cancer-free Progression from Censored Heterogenous Clinical Imaging", *SPIE IP:MI,* 2020.
10. H. Liao, **Y. Tang**, F. Gareth, J. Luo, and Kevin S. Zhou, "More knowledge is better: Cross-modality volume completion and 3d+ 2d segmentation for intracardiac echocardiography contouring", *MICCAI*, 2018.

Others

1. X. Yu, **Y. Tang**, Q. Yang, H. H. Lee, S Bao, A. Z. Moore, L. Ferrucci, and B. A. Landman. "Accelerating 2D Abdominal Organ Segmentation with Active Learning." *Medical Imaging 2022: Image Processing. International Society for Optics and Photonics,* 2022.

2. Q. Yang, X. Yu, H. H. Lee, **Y. Tang**, S. Bao, K. S Gravenstein, A. Z. Moore, S. Makrogiannis, L. Ferrucci, and B. A. Landman. "Quantification of muscle, bones and fat on single slice thigh CT" *Medical Imaging 2022: Image Processing. International Society for Optics and Photonics*
3. Ho Hin Lee, Yucheng Tang, Shunxing Bao, Qi Yang, Xin Yu, Agnes B. Fogo, Raymond Harris, Mark P. de Caestecker, Jeffery M. Spraggins, Mattias Heinrich, Yuankai Huo, Bennett A. Landman, "Supervised Deep Generation of High-Resolution Arterial Phase Computed Tomography Kidney Substructure Atlas", *SPIE 2022 Medical Imaging*
4. S. Bao, **Y. Tang**, H. H. Lee, R. Gao, Q. Yang, X. Yu, S. Chiron, L. A. Coburn, K. T. Wilson, J. T. Roland, B. A. Landman, Y. Huo. "Inpainting Missing Tissue in Multiplexed Immunofluorescence Imaging" *SPIE Medical Imaging 2022: Digital and Computational Pathology.*
5. **Y. Tang**, R. Gao, H. H. Lee, B. V. Savoie, S. Bao, Y. Huo, A. Fogo, R. Harris, M. deCaestecker, J. Spraggins, and B. A, Landman, "Renal Cortex, Medulla, Pelvis Segmentation on Arterial Phase CT Images with Random Patch-based Networks", *SPIE, Medical Imaging*, 2021.
6. S. Bao, S. Chiron, **Y. Tang**, C. N. Heiser, A. N. Southard-Smith, H. H. Lee, M. A. Ramirez, Y. Huo, M. K. Washington, E. A. Scoville, J. T. Roland, Q. Liu, K. S. Lau, K. T. Wilson, L. A. Coburn, and B. A. Landman, "A cross-platform informatics system for the Gut Cell Atlas: integrating from clinical, anatomical and histological data", *SPIE, Medical Imaging*, 2021.
7. K. Xu, R. Gao, M. S. Khan, S. Bao, **Y. Tang**, S. A. Deppen, Y. Huo, K. L. Sandler, P. P. Massion, M. P. Heinrich, and B. A. Landman, "Development and characterization of a chest CT atlas", *SPIE, Medical Imaging*, 2021.
8. R. Gao, **Y. Tang**, K. Xu, M. N. Kammer, S. L. Antic, S. Deppen, K. L. Sandler, P. P. Massion, Y. Huo, and B. A. Landman, "Deep Multi-path Network Integrating Incomplete Biomarker and Chest CT Data for Evaluating Lung Cancer Risk", *SPIE, Medical Imaging*, 2021.
9. H. H. Lee, **Y. Tang**, K. Xu, S. Bao, A. B. Fogo, R. Harris, M. P. de Caestecker, M. Heinrich, J. Spraggins, Y. Huo, and B. A, Landman, "Construction of a Multi-Phase Contrast Computed Tomography Kidney Atlas", *SPIE, Medical Imaging*, 2021.
10. C. Luo, J. G. Terry, **Y. Tang**, K. Xu, P. P. Massion, B. A. Landman, J. J. Carr, and Y. Huo, "Measure Partial Liver Volumetric Variations from Paired Inspiratory-expiratory Chest CT Scans", *SPIE, Medical Imaging*, 2021.
11. O. Tang, Y. Xu, **Y. Tang***, H. H. Lee, Y. Chen, D. Gao, S. Han, R. Gao, M. R. Savona, R. G. Abramson, Y. Huo, and B. A. Landman, "Validation and Optimization of Multi-Organ Segmentation on Clinical Imaging Archives", *SPIE IP:MI,* 2020.
12. Y. Xu*, O. Tang*, **Y. Tang****, H. H. Lee, Y. Chen, D. Gao, S. Han, R. Gao, M. R. Savona, R. G. Abramson, Y. Huo, and B. A. Landman, "Outlier Guided Optimization of Abdomen Segmentation", *SPIE IP:MI*, 2020.
13. H. H. Lee, **Y. Tang***, Y. Xu, O. Tang, Y. Chen, D. Gao, S. Han, R. Gao, M. R. Savona, R. G. Abramson, Y. Huo, and B. A. Landman, "Semi-Supervised Multi-Organ Segmentation through Quality Assurance Supervision", *SPIE IP:MI*, 2020.
14. Y. Yang, R. Gao, **Y. Tang**, S. L. Antic, S. Deppen, Y. Huo, K. L. Sandler, P. P. Massion, and B. A. Landman, "Internal-transfer Weighting of Multi-task Learning for Lung Cancer Detection", *SPIE IP:MI*,2020.
15. **Y. Tang**, Y. Huo, Y. Xiong, H. Moon, A. Assad, T. K. Moyo, M. R. Savona, R. G. Abramson, and B. A. Landman, "Improving Splenomegaly Segmentation by Learning from Heterogeneous Multi-Source Labels", *SPIE Medical Imaging, Image Processing*, 2019.
16. R. Gao, Y. Huo, S. Bao, **Y. Tang,** S. L. Antic, E. S. Epstein, A. B. Balar, S. Deppen, A. B. Paulson, K. L. Sandler, P. P. Massion and B. A. Landman, "Distanced LSTM: Time-Distanced Gates in Long Short-Term Memory Models for Lung Cancer Detection", *In International Workshop on Machine Learning in Medical Imaging*, 2019.

Patents:

1. Three-Dimensional Segmentation from Two-Dimensional Intracardiac Echocardiography Imaging (US Patent App. 16/130,320)
2. Collaborative Volume Completion and Contour Detection System For Intracardiac. (US Patent App. 62/634,935)

External Service

Journal Reviewing:

IEEE Transactions on Medical Imaging (TMI)

Medical Image Analysis (MedIA)

PLOS ONE

Conference Reviewing:

MICCAI 2020 International Conference on Medical Image Computing & Computer Assisted Intervention

International Conference on Computer Vision (ICCV 2021)

International Conference on Machine Learning (ICML 2021)

Association for the Advancement of Artificial Intelligence (AAAI 2021)

Student Mentoring

BS, CS, Vanderbilt U & Google, Yiyuan Yang, **Topic:** Validation on Splenomegaly with volumetric Measurements

BS, CS, Vanderbilt U, Olivia Tang, **Topic:** Abdominal Segmentation on Clinical Imaging Archive

BS, CS & Neural Science, Vanderbilt U, Yuchen Xu, **Topic:** Abdominal Segmentation on Validation of outlier Data

BS, CS & math, Vanderbilt U, Canwen Jiao, **Topic:** Aorta segmentation and Analysis

Presentation and Talks

Conference Presentation

2021 **MICCAI**, France, **Title:** Pancreas CT Segmentation by Predictive Phenotyping

2020 **MICCAI**, Peru (Virtual), **Title:** Prediction of Type II Diabetes Onset with Computed Tomography and Electronic Medical Records

2020 **SPIE**, Houston, TX, **Title:** Contrast Phase Classification with a Generative Adversarial Network.

2019 **SPIE**, San Diego, CA, **Title:** Improving Splenomegaly Segmentation by Learning from Heterogeneous Multi-Source Labels.

Invited Talk

2019 **12 Sigma Technologies**, **Title:** Toward the practical utilization of quantitative imaging biomarkers: Combining Deep Learning with Anatomical Context Network.

Academic Events Organization

Seminars

2020 VISE Annual conference, Organizer

2021 ICCV CVAMD Workshop, program committee