Lin Tian

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Summary

My research interests broadly lie in computer vision (2D and 3D), medical imaging and machine learning. My recent research focus on (1) Robust and accurate deep learning for non-rigid image registration cross mono-modality, multi-modality, and limited view 2D images to 3D images, and (2) Dynamic subject 3D reconstruction from 2D images or videos (2D tomosynthesis images, ultrasound images and RGBD images).

Education

Ph.D. in Computer Science	**University of North Carolina at Chapel Hill** | *North Carolina, U.S.*	2019-2024
M.S. in Computer Science	**University of Southern California** | *California, U.S.*	2010-2012
B.Eng. in Software Engineering	**Huazhong University of Science and Technology** | *Hubei, China*	2006-2010

Publications

Demir, Başar, **Lin Tian**, Hastings Greer, Roland Kwitt, François-Xavier Vialard, Raúl San José Estépar, Sylvain Bouix, Richard Rushmore, Ebrahim Ebrahim, and Marc Niethammer. "MultiGradICON: A Foundation Model for Multimodal Medical Image Registration". ***In International Workshop on Biomedical Image Registration, 2024***.

Baheti, Bhakti, ... **Lin Tian** (the 58th), ... et al. "The brain tumor sequence registration challenge: establishing correspondence between pre-operative and follow-up MRI scans of diffuse glioma patients". ***In Journal Submission. ArXiv. org 2112.06979v2 (2024)***.

Lin Tian, Hastings Greer, Roland Kwitt, François-Xavier Vialard, Raúl San José Estépar, Sylvain Bouix, Richard Rushmore, Marc Niethammer. "uniGradICON: A Foundation Model for Medical Image Registration". ***MICCAI 2024***.

Lin Tian, Hastings Greer, Raúl San José Estépar, Soumyadip Sengupta, Marc Niethammer. "NePhi: Neural Deformation Fields for Approximately Diffeomorphic Medical Image Registration". ***ECCV 2024***.

Lin Tian*, Zi Li*, Fengze Liu, Xiaoyu Bai, Jia Ge, Le Lu, Marc Niethammer, Xianghua Ye, Ke Yan, Dakai Jin. "SAME++: A Self-supervised Anatomical eMbeddings Enhanced medical image registration framework using stable sampling and regularized transformation". ***In Journal Submission***.

Zi Li*, **Lin Tian***, Tony CW Mok, Xiaoyu Bai, Puyang Wang, Jia Ge, Jingren Zhou, Le Lu, Xianghua Ye, Ke Yan, Dakai Jin. "SAMConvex: Fast Discrete Optimization for CT Registration Using Self-supervised Anatomical Embedding and Correlation Pyramid". ***MICCAI 2023***.

Hastings Greer, **Lin Tian**, Francois-Xavier Vialard, Roland Kwitt, Sylvain Bouix, Raul San Jose Estepar, Richard Rushmore, Marc Niethammer. "Inverse Consistency by Construction for Multistep Deep Registration". ***MICCAI 2023***.

Lin Tian*, Hastings Greer*, François-Xavier Vialard, Roland Kwitt, Raúl San José Estépar, Richard Jarrett Rushmore, Nikolaos Makris, Sylvain Bouix, Marc Niethammer. "GradICON: Approximate Diffeomorphisms via Gradient Inverse Consistency". ***CVPR 2023***.

Lin Tian, Yueh Z Lee, Raúl San José Estépar, Marc Niethammer. "LiftReg: Limited Angle 2D/3D Deformable Registration". ***MICCAI 2022***.

Peirong Liu, **Lin Tian**, Yubo Zhang, Stephen Aylward, Yueh Lee, Marc Niethammer. "Discovering Hidden Physics Behind Transport Dynamics". ***CVPR 2021***.

Lin Tian, Connor Puett, Peirong Liu, Zhengyang Shen, Stephen R Aylward, Yueh Z Lee, Marc Niethammer. "Fluid Registration Between Lung CT and Stationary Chest Tomosynthesis Images". ***MICCAI 2020***.

Research Experience

Massachusetts General Hospital and Harvard Medical School *Boston, U.S.*

Research Fellow, Supervisor: Dr. Juan Eugenio Iglesias *September 2024 - Present*

- Develop medical image analysis tools for **low-field MRI** with applications to Alzheimer's and stroke disease study.
- Develop reconstruction algorithm for ***ex vivo*** **brain dissection photographs**.

Department of Computer Science, University of North Carolina at Chapel Hill *Chapel Hill, U.S.*

Research Assistant, Supervisor: Dr. Marc Niethammer *Aug 2019 - July 2024*

- **Non-rigid deformations**: (1) Research on a novel approximately diffeomorphic **transformation regularization** via gradient inverse consistency, leading SOTA performance of 3D registration on Lung, Brain, and knee datasets. (2) Study on generalizable **neural deformation field** for high-resolution 3D image registration. (3) Research on **a foundation model** for 3D image registration across anatomical regions and motion patterns.
- Motion estimation between 3D and limited view 2D images: Research on estimating motion between 3D CT and limited view 2D tomosynthesis with **differentiable volume rendering** and non-rigid transformation.
- 3D Reconstruction from limited view 2D images: Reconstructing 3D CT from 2D tomosynthesis via differentiable projection operator and radiograph consistency.

Google X, Alphabet Inc. *Mountain View, CA, U.S.*

PhD Residency, Supervisor: Dr. Alexander Zoellner, Dr. Ningrui Li and Dr. Atilla Kiraly *May 2023 - Aug 2023*

- 3D Dynamic Subject Reconstruction: Reconstructing 3D dynamic subject from videos using **implicit neural representation** and **neural rendering**.

Damo Academy, Alibaba Group *New York, U.S.*

Research Scientist Intern, Supervisor: Dr. Dakai Jin, Dr. Ke Yan and Dr. Ling Zhang *May 2022 - Aug 2022*

- Self-Supervised Pre-trained Representation: Conducted research on self-supervised pre-trained representation-based **point set registration** and 3D image registration, enhancing registration accuracy and efficiency.
- Optimal Transport in Feature Space: Investigated point set registration via optimal transport in the feature space, contributing to improved alignment and matching in 3D point clouds.

AI Lab, ByteDance Ltd. *Mountain View, CA, U.S.*

Research Scientist Intern, Supervisor: Dr. Imran Saleemi *May 2021 - Aug 2021*

- 3D Shape Reconstruction and Novel View Synthesis: Research in 3D **shape reconstruction** and novel view synthesis from RGBD images, leveraging neural representations of **signed distance functions** (SDF) and differentiable volume rendering to advance visual computing technologies.

Ruijia Technology Inc. *Wuhan, China*

Machine Learning Engineer, Supervisor: Dr. Rong Yuan *Mar 2017 - Aug 2019*

- Transfer Learning for Brain Glioma Classification: Conducted research on using transfer learning techniques to classify brain glioma as abnormal or benign from MRI images, contributing to medical image analysis.
- Lung Nodule Detection: Implemented a state-of-the-art lung nodule detection system from CT images using faster R-CNN, improving early disease detection.

Skills

Programming Python, C/C++, C#, CUDA, CMake, Git, Scripting (Bash), LaTeX

Software Pytorch, Tensorflow, ITK, Scikit-learn, Linux, Unity Engine

Honors

2022	**Student Travel Award**, MICCAI	*Singapore*
2008	**Scholarship of Citizen**, Huazhong University of Science and Technology	*China*
2006	**National Scholarship (Top 1%)**, Huazhong University of Science and Technology	*China*
2006	**Scholarship of Citizen**, Huazhong University of Science and Technology	*China*
2006	**Outstanding Student (Top 1%)**, Huazhong University of Science and Technology	*China*

Academic Services

2025	**Area Chair**	MICCAI
2025	**Reviewer**	Medical Image Analysis
2024	**Reviewer**	Medical Image Analysis, MICCAI, AAAI, ECCV
2023	**Reviewer**	IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Medical Imaging, Medical Image Analysis, MICCAI
2022	**Reviewer**	ECCV
2020	**Reviewer**	Medical Image Analysis

Other Experience

Lilith Games *Shanghai, China*

Virtual Reality Game Producer | PongIt!VR (Steam) *May 2015 - Feb 2017*

- Project Initiation and Team Building: Initiated the project and assembled a five-member team. Successfully collaborated with the marketing team to launch the game on Steam.
- Market Analysis and Strategy: Conducted in-depth research on VR/AR devices and game markets to influence game positioning and design.
- Business Development and Partnerships: Drove strategic alliances with major VR device companies, such as Oculus, HTC, and SONY, resulting in successful development and publishing agreements.
- Leadership and Project Management: Led regular team meetings and oversaw the end-to-end game production process, ensuring the achievement of project milestones.
- User Metrics and Growth Strategy: Monitored and analyzed user metrics related to acquisition and retention. Proposed and implemented innovative features and content enhancements, leading to a tenfold increase in the user base.

Lilith Games *Shanghai, China*

Senior Game Designer | Soul Hunters (iOS & Android), Most profitable game in China 2014 *May 2015 - Feb 2017*

- Gameplay System and Campaign Design: Designed engaging gameplay systems and campaigns to consistently maintain user activity and retention, enhancing the overall user experience.
- Cross-Functional Collaboration: Collaborated seamlessly with engineers, UI designers, artists, and QA teams to ensure the successful development and delivery of new gameplay systems and campaigns.
- Data Analysis and User Retention Strategies: Implemented data analysis scripts to collect and analyze user data, allowing for data-driven decision-making and the formulation of effective user retention strategies.

Netease Games *Shanghai, China*

System Designer | My Love from the Star (iOS & Android) *Jun 2014 - May 2015*

- Gameplay Design: Developed and designed core gameplay mechanics, enhancing the player experience and engagement.
- Market Analysis and Positioning: Conducted in-depth market analysis under the supervision of the producer to refine the game's market positioning and strategy, contributing to its success.
- Resource Management: Managed and supervised the production progress and cost of art resources, ensuring efficient resource allocation and project cost-effectiveness.

Disney Interactive Media Group *Los Angeles, CA, U.S.*

Game Development Engineer | Stack Rabbit (iOS & Android) *Jun 2012 - May 2014*

- Player Progression and UI System Development: Designed and implemented a player progression system and user interface (UI) using **C#** within **Unity3D**, enhancing user engagement and gameplay experience.
- Production Infrastructure Optimization: Engineered an internal production infrastructure, enabling artists to efficiently preview, adjust, and deploy art assets within the project, resulting in a significant reduction in asset deployment time.
- Version Control and Continuous Integration Expertise: Designed and maintained a robust **Git** version control workflow and implemented continuous integration processes using **Jenkins**, enhancing project collaboration and ensuring code stability.
- Game Packaging and Delivery Management: Managed the packaging of the game for **iOS** and **Android** platforms and efficiently delivered updates to the publishing team, ensuring the timely release of game updates and minimizing delivery errors.

Disney Interactive Media Group *Los Angeles, CA, U.S.*

Game Development Engineer | Where's My Water (iOS & Android), 2012 Apple Design Award *Jun 2012 - May 2014*

- Gameplay Feature Development in C++: Spearheaded the implementation of innovative gameplay features using **C++**, enhancing the user experience and gameplay depth.
- Optimization of 2D Sprite Rendering: Successfully maintained and optimized the 2D sprite **rendering pipeline** within our in-house **game engine**, resulting in improved rendering performance and visual quality.
- Integration of Third-Party APIs: Expertly integrated third-party APIs for authentication and in-app purchases, including Facebook authentication, Apple In-App Purchasing, and Kindle In-App Purchasing, expanding the game's functionality and monetization capabilities.