Lei Tong

Artificial Intelligence · PhD in Computer Science

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Professional Summary

Lei Tong is a Postdoctoral Researcher at AstraZeneca R&D Cambridge, UK. His research focuses on computer vision and biomedical image analysis, with particular emphasis on multimodal generative models and causal representation learning. He has published over 20 SCI-indexed papers, including five first-author publications in top-tier conferences and journals. During his PhD, he received funding from the University of Leicester, AstraZeneca, and the China Scholarship Council. He has been actively involved in collaborative research projects with AstraZeneca and Leicester Royal Infirmary, with experience in algorithm design, experimental validation, and real-world deployment. He also serves as a reviewer for international conferences and journals, including CVPR, ICLR, and JBHI.

Research Interests: Computer Vision | Biomedical Image Analysis | Multimodal Generative Models | Causal Learning

Career Objective: Biomedical AI Research Scientist | Computer Vision Research Scientist | AIGC Algorithm Engineer

Education and Research Experience

- 2024.07 – Present AstraZeneca R&D Cambridge, UK Postdoctoral Researcher
- 2020.05 – 2024.05 University of Leicester, UK PhD in Computer Science
- 2018.04 – 2020.04 University of Leicester, UK MSc in Computer Science
- 2013.09 – 2017.06 NingboTech Institute, Zhejiang University BSc in Computer Science

Honors & Awards

- China Scholarship Council (CSC) Scholarship (2020): ¥400K, with a selection rate of 20%.
- University of Leicester GTA Scholarship (2020): £90K, with a selection rate of 10%.
- AstraZeneca Scholarship (2020): £30K, with a selection rate of 10%.

Publications

Published/accepted 20+ SCI-indexed papers, with 1,359 citations on Google Scholar： user=lrWRg2MAAAAJ

Selected Publications

[P1] **Causal-Adapter: Taming Text-to-Image Diffusion for Faithful Counterfactual Generation**
Lei Tong, Zhihua Liu, Chaochao Lu, et al.
ICML International Conference on Machine Learning, 2026

[P2] **Adversarial Batch Representation Augmentation for Batch Correction in High-Content Cellular Screening**
Lei Tong, Xujing Yao,Adam Corrigan, et al.
KBS Knowledge-Based Systems, 2026 (JCR Q1, Impact Factor: 7.6)

[P3] **CLANet: A Comprehensive Framework for Cross-Batch Cell Line Identification Using Brightfield Images**
Lei Tong, Adam Corrigan, Navin Rathna Kumar, et al.
MedIA Medical Image Analysis, 2024 (JCR Q1, Impact Factor: 13.7)

[P4] **Cost-sensitive Boosting Pruning Trees for Depression Detection on Twitter**
Lei Tong, Zhihua Liu, Zheheng Jiang, et al.
TAE IEEE Transactions on Affective Computing, 2022 (JCR Q1, Impact Factor: 11.9, 79 citations)

[P5] **An Automated Cell Line Authentication Method for AstraZeneca Global Cell Bank Using Deep Neural Networks on Brightfield Images**
Lei Tong, Adam Corrigan, Navin Rathna Kumar, et al.
SR Scientific Reports, 2022 (JCR Q2, Impact Factor: 4.9)

Professional Experience

AstraZeneca R&D Cambridge, Centre for AI | Postdoctoral Researcher *2024.07 – Present*

Multimodal Generation and Causal Reasoning Algorithm Research *Cambridge, UK*

- Conduct research on multimodal reasoning and controllable generation, covering video understanding, causal scene modeling, diffusion model fine-tuning, and counterfactual image generation.
- Built a counterfactual generation framework for lesion evolution reasoning in Alzheimer's disease MRI, based on diffusers, adapting Stable Diffusion and FLUX with ControlNet and causal semantic injection; supports deployment on a single 24GB GPU.
- Investigate video physical reasoning with Qwen-VL and Cosmos-Reason, leveraging latent reasoning, chain-of-thought, and causal scene graphs to model object states and interactions for physical understanding in complex scenes.

AstraZeneca R&D Cambridge, Quantitative Biology Imaging Group | Research Intern *2023.10 – 2023.12*

Cell Imaging Algorithm Development *Cambridge, UK*

- Developed algorithms for high-content screening cell imaging, addressing cross-batch distribution shifts in gene perturbation recognition via domain generalization.
- Designed the Adversarial Batch Representation Augmentation method, combining batch-level uncertainty modeling, min-max adversarial optimization, ArcFace Loss, and JS divergence to improve robustness and fine-grained discrimination.
- Validated the method on RxRx1/RxRx1-WILDS for 1,139-class siRNA classification, achieving +10.9% accuracy on the RxRx1-WILDS OOD test set and +4.3% on standard RxRx1 over the ERM baseline; related work has been accepted by *Knowledge-Based Systems*.

Leicester Royal Infirmary | Algorithm Engineer *2018.12 – 2019.07*

Algorithm Development for Rehabilitation Monitoring *Leicester, UK*

- Developed a frozen shoulder rehabilitation monitoring system based on RealSense Camera and Nuitrack, enabling human skeleton tracking, shoulder motion metric computation, and quantitative rehabilitation assessment, with real-time measurement at 30 FPS.
- Developed the software interface and visualization functions in C#, supporting patient motion capture, key joint-angle display, and rehabilitation result recording; the system was applied to clinical assessment and assisted monitoring in more than 50 patient cases.

Projects

Taming Text-to-Image Diffusion for Counterfactual Generation *2024.07 – 2025.12*

AstraZeneca UK Postdoctoral Fellowship *ICML 2026*

- Designed Causal-Adapter for controllable counterfactual editing in text-to-image diffusion models, addressing inaccurate attribute control, semantic entanglement, and poor identity preservation.
- Built an inter-attribute causal modeling module based on structural causal model (SCM) and the abduction–action–prediction paradigm, and proposed Prompt-Aligned Injection and Conditioned Token Contrastive to improve alignment and disentanglement.
- The framework supports Stable Diffusion 3 and FLUX on a single 24GB GPU, improving attribute control accuracy by 91% on CelebA and reducing FID by 87% on ADNI.
- **Keywords**: Stable Diffusion | Adapter/PEFT | ControlNet | DDIM | Causal Inference | SCM | Contrastive Learning

Cross-Batch Cell Line Identification Using Brightfield Images *2022.05 – 2023.05*

AstraZeneca Cambridge – University of Leicester EPSRC Project *MedIA 2024*

- Designed CLANet for cross-batch cell line identification in cell bank quality control using 32 cell lines, 93 experimental batches, and 165,190 brightfield images.
- Proposed Cell Cluster-level Selection for representative patch sampling, and combined DINO, Time-Series Segment Sampling, and Gated Attention MIL to improve robust cross-batch identification.
- Achieved 89.1% sequence-level accuracy and 90.7% batch-level accuracy under independent cross-batch testing; the system has been deployed in practice.
- **Keywords**: ViT | DINO | Cell Segmentation | Self-Supervised Learning | Multiple Instance Learning | Temporal Sampling

Skills

Programming	Python, C#, Java, Git, Bash, CMake, HTML
AI/Deep Learning	PyTorch, OpenCV, diffusers, Transformers; multimodal generation, biomedical imaging, diffusion fine-tuning
Research & Engineering	Data processing, model design, training, evaluation, prototyping, deployment
Languages	English (professional), Chinese (native)