Zhengxu Tang

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EDUCATION

University of Michigan Expected May 2025
Bachelor of Science in Mathematical Science & Bachelor of Science in Statistics
Michigan State University Sep 2020 - May 2022
Bachelor of Science in Mathematics
Awards: Dean's Lists
Relevant Courses: Computational Neuroscience, Mathematical Models, Bioinformatics Concepts and Algorithms, High Throughput Molecular Genomic and Epigenomic Data Analysis, Theoretical Statistics, Programming and Data Structures, Biomedical AI

PUBLICATIONS & PRESENTATION

Under Review

- [1]Wu C*, ShuaiZ*, **Tang Z***, Wang L, and Shen L‡. *Dynamic Modeling of Patients, Modalities and Tasks via Multi-modal Multi-task Mixture of Experts*. **ICLR 25**
- [2] Shuai Z*, Wu C*, **Tang Z***, Song B, and Shen L‡. *Latent Space Disentanglement in Diffusion Transformers Enables Zero-shot Fine-grained Semantic Editing*. **Transactions on Machine Learning Research**
- [3]Restrepo D*, Wu C*, **Tang Z**, Shuai Z, Phan TNM, Ding JE, Morley MG, …, and Nakayama LF‡. *Multi-OphthaLingua: A Multilingual Benchmark for Assessing and Debiasing LLM Ophthalmological QA in LMICs*. **AAAI 25**
- [4]Kim R, Fang Y, Lee M, Kim DW, **Tang Z**, Sen S, and Forger D‡. *Predicting Inter-individual Differences in Photoperiodic Encoding and Shift Work Adaptation in Medical Interns*. **Cell iScience**
- [5]Mottini V*, Xing L*, Meilinger C, Inamdar S, Chen XC, Wang J, Xing Y, Darbonne J, **Tang Z**, Contag C, Zhang M, and Li J. InSkin: Inclusive Skin Biointerface through Intrinsically Stretchable Electronics. **Science**

In Preparation

- [6]**Tang Z***, Zhang Y*, Daha A, Mottini V, Xing L, and Li J. Soft Magnetic Actuator for Stretchable, Bio-compatible, Underwater Soft Robots.
- [7]Mozel K*, **Tang Z***, Tang T, Mottini V, Venkatashiva P, Fu R, Chen X, Li XJ, and Li J‡. Imaging and Tracking Microrobots In Vivo and In Vitro: A Unique Approach Using Magnetic Particle Imaging and Computed Tomography.

Presentation

- Shuai Z*, Wu C*, **Tang Z***, Song B, and Shen L‡. Exploring Disentangled Latent Space of Text-to-Image Diffusion Transformer for Fine-grained Semantic Editing. **Multimodal AI TTIC 2024**

RESEARCH EXPERIENCES

Biomedical AI Lab, University of Michigan July 2023 - Present
Undergraduate Researcher **Advisor: Dr. Liyue Shen**

❖ [1] Multi-Modal Multi-Task Mixture of Experts for Medical Imaging
- ➢ Proposed the M4oE model for medical imaging to tackle 1) patient sample-dynamic modality fusion and 2) modality-task dependence, where different tasks may require dynamic feature selection and combination from various data modalities.
- ➢ Building the M4oE model, collecting and processing the data, researching relevant technical and clinical literature, and reproducing all baseline experiments.

❖ [2] Uncovering Disentanglement in Diffusion Transformer for Image Editing
- ➢ Uncovered and investigated the semantic disentanglement effect in text-to-image Diffusion Transformers; Proposed a zero-shot precise image editing method.
- ➢ Researched 3 different diffusion models and tested 7 different approaches for manipulating text and image embeddings to modify images based on given text conditions. Implemented and tested 7 baseline models.

Lab of Computational Physiology, MIT Jan 2024 - Present
Undergraduate Researcher **Advisor: Dr. Leo A Celi**

❖ [3] Multi-Agent RAG for Debiasing Multilingual Ophthalmological QA
- ➢ Developed a multi-agent RAG system to reduce biases in LLMs for multilingual ophthalmological question-answering, improving performance and fairness across diverse languages in Low and Middle-Income Countries (LMICs).

- ➢ Built the multi-agent RAG model by designing and implementing different agent combinations. Ran baseline models and evaluated the performance of 6 different LLMs on our benchmark.

❖ Longitudinal Diffusion for Retinal disease prognosis

- ➢ Proposed an interpretable retinal disease prognosis paradigm using a generative model to capture temporal information from Color Fundus Photos (CFP) data and designed a multimodal survival prediction model integrating EHR and CFP.
- ➢ Fine-tuned the stable diffusion model and built the multimodal survival prediction model.

Medical Imaging Lab, University of Michigan May 2024 - Sep 2024

Undergraduate Researcher **Advisor: Dr. Lise Wei**

❖ Head & Neck Cancer Survival Analysis

- ➢ Organized and processed raw 3D medical imaging and EHR data from a private medical school database using techniques such as spatial resampling, cropping, and registration.
- ➢ Implemented UNet-based and Transformer-based multimodal survival analysis models, testing different combinations of multiparametric MRI (T1, Blood Volume, ADC) and PET to interpret modality contributions.

Math Department, University of Michigan July 2023 - May 2024

Undergraduate Researcher **Advisor: Dr. Ruby Kim**

❖ ADHD PK/PD Circadian Rhythms Model

- ➢ Individually implemented MATLAB models for dopamine secretion, Ritalin PK/PD, and mammalian circadian rhythms.
- ➢ Developed the first comprehensive system capable of accurately simulating Ritalin's interaction with dopamine for ADHD patients in circadian rhythms.

Li Lab, Michigan State University July 2023 - May 2024

Undergraduate Researcher **Advisor: Dr. Jinxing Li**

❖ [6] Soft Electromagnetic Actuators

- ➢ Developed a novel soft electromagnetic actuator with highly stretchable and conductive silver composite coils encapsulated in elastomers, capable of operating both in air and water. Used it to build a flexible robot that moves agilely underwater.
- ➢ Led the team in testing various base materials and laser-cut imprinting methods for conductive silver paste on SEBS, identifying the optimal configuration for durability and flexibility, and successfully designing and building the robot.

❖ [7] In Vivo & In Vitro Micro Robot Orientation

- ➢ Developed a 3D-printed helical microrobot with magnetic control for precise in vivo and in vitro movement, combining MPI and CT for non-invasive tracking and imaging in biomedical applications.
- ➢ Led the team in designing the microrobot and developed various molds for 3D printing. Collaborated with the medical school to conduct in vivo experiments. Independently operated CT and MPI systems to track and image the microrobot's movement.

Teaching Experience

MATH 462 Mathematical Models, University of Michigan Spring 2024

TA: Assignments grading, Project mentoring, Office hours **Class size:** 30 graduate and undergraduate students

OUTREACH

Ongather Online Study Association, East Lansing, Michigan

Co-founder Nov 2020 - May 2021

- Established an online international student study community during the pandemic with 400 student members. Utilized the platform to help members connect and support each other
- Led the technical team of 8 in building and maintaining the organization's website. Developed and managed a WeChat mini-program to improve event coordination and promotion, increasing the operational efficiency of xx.

Electrify Tech Camp AI Magic 2024, Ann Arbor, Michigan

Instructor: Summer 2024

- Introduced generative AI concepts like diffusion models and LLMs to 25 high school students, guided students in designing AI projects, and provided technical support through office hours.

SKILLS & INTERESTS

Programming Languages: Python, C, C++, MATLAB, R, Pytorch, Scikit-Learn, PytorchLightning, Tensorflow

Software: Fusion 360, ANSYS, Solidworks, Arduino, Comsol, Mathematica, Blender, Adobe Illustrator

Language: Chinese (Mandarin), English **Interests:** Film photography, Biking, Cooking, Hi-fi audio, Working out