Tang Li

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Research Interests

- **Explainable Machine Learning** (e.g., Robust Explanations, Concept-level Explanations)
- **Scientific Machine Learning** (e.g., Out-of-Distribution Generalization, Knowledge Discovery)
- **Large Foundation Models** (e.g., Vision-Language Models, Large Language Models)

Education

University of Delaware   *Newark, DE, USA*

Ph.D. in Computer Science   *August 2020 - May 2025 (Expected)*

George Washington University   *Washington, D.C., USA*

M.S. in Computer Science   *August 2018 - May 2020*

East China Normal University   *Shanghai, China*

B.Eng. in Software Engineering   *September 2013 - July 2017*

Research Experience

Deep-REAL Lab, University of Delaware   *Newark, DE, USA*

Research Assistant, Advised by Prof. Xi Peng   *March 2021 - Present*

- Concept-level Explanations and Fine-grained Alignments for Vision-Language Models [**ECCV'24** (**Under Review**), **NeurIPS'24** (**Under Review**)]
  Large pre-trained vision-language models (VLMs), such as CLIP, have become ubiquitous "foundations" for other models. However, our empirical results reveal that they can hardly distinguish between fine-grained concepts. To tackle this issue, we propose extracting linguistic concepts from large language models like GPT-4, and subsequently disentangling and localizing their explanations within VLMs in a self-supervised manner.
- Robust Explanation against Out-of-Distribution (OoD) Data [**CVPR'23**]
  Our empirical results reveal that, despite correct predictions, models trained with existing methods might yield unreliable explanations when encountering OoD data. To address this issue, we propose distributionally robust explanation (DRE) that seamlessly integrates explanation consistency into a principled optimization framework.
- Large-scale Spatiotemporal Scientific Data Modeling [**NeurIPS'21W** (**Best Paper Award**), **Nature Computational Science'24** (**Under Review**)]
  We transform world-scale geospatial data into image-like data and develop deep models to predict the urbanization process in the 21st century. We further attribute the model's predictions to topographic and demographic factors, and discover different urbanization patterns across continents.

Publications

Conference Proceedings

C3.   Mengmeng Ma, **Tang Li**, and Xi Peng, **"Beyond the Federation: Topology-aware Federated Learning for Generalization to Unseen Clients"**. In: *Proceedings of the International Conference on Machine Learning*, 2024. ***ICML, conference rank 3rd in Artificial Intelligence, acceptance rate 27.5%.**

C2.   **Tang Li**, Fengchun Qiao, Mengmeng Ma, and Xi Peng, **"Are Data-driven Explanations Robust against Out-of-distribution Data?"**. In: *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, 2023. ***CVPR, conference rank 1st in Engineering & Computer Science, acceptance rate 25.8%.**

C1.   **Tang Li**, Jing Gao, and Xi Peng, **"Deep Learning for Spatiotemporal Modeling of Urbanization"**. In: *Proceedings of the Conference on Neural Information Processing Systems, Machine Learning in Public Health Workshop, Best Paper Award*, 2021. ***NeurIPS, conference rank 1st in Artificial Intelligence, acceptance rate 25.8%.**

Honors & Awards

2021   **Best Paper Award,** MLPH Workshop, Conference on Neural Information Processing Systems (NeurIPS)
2022   **Distinguished Graduate Student Award,** Computer & Information Sciences, University of Delaware
2023   **Department Travel Award for Outstanding Conference Publications,** University of Delaware
2024   **Distinguished Graduate Student Award,** Computer & Information Sciences, University of Delaware

Professional Services

Conference and Journal Reviewer

- Annual Conference on Neural Information Processing Systems (NeurIPS), 2023-2024
- IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2023-2024
- AAAI Conference on Artificial Intelligence (AAAI), 2024
- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2022
- British Machine Vision Conference (BMVC), 2024
- Remote Sensing (RS), 2022

DSI Fellow

- University of Delaware Data Science Institute (DSI), 2022-Present

Teaching Assistant

- CISC 484 (Introduction to Machine Learning), Fall2022
- CISC 220 (Data Structure), Fall2023, Spring2024
- CISC 181 (Introduction to Computer Science II), Spring2022, Spring2023
- CISC 108 (Introduction to Computer Science), Fall2020, Spring2021, Fall2021

Technical Skills

Programming Languages	Python (Advanced), Java (Intermediate), C/C++ (Intermediate), HTML/CSS (Intermediate)
Frameworks	PyTorch
Tools and Platforms	Linux, MacOS, Windows, Git, LaTeX, SciPy, NumPy