

# Tan Zhu

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## QUALIFICATIONS

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- Publish papers at top-tier conferences such as **NeurIPS** and **AAAI**, and the top-tier journals by the **IEEE Transactions** and the **Nature Publishing Group**.
- Ongoing work includes **dataset distillation** for the large-scale machine learning model, fine-tuning **Large Language Model (LLM)** for the click-through rate prediction task using **Llama 2 and Huggingface**, and constructing depression/anxiety diagnostic model based on the **BERT architecture**.
- Specialized in architecture, interpretability, and analytical assessment of expression capabilities within deep learning models for the click-through rate prediction task.
- Strong knowledge of theory, practice, and research experience on **reinforcement learning** focusing on the convergence analysis of deep stochastic contexture bandit problem and Monte Carlo tree search on Go game.
- Proficient in Python and C++, with advanced expertise in machine learning frameworks including PyTorch and Scikit-learn, has experience in CUDA coding, complemented by strong capabilities in data manipulation using Numpy, Pandas.

## EDUCATION

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- **University of Connecticut, GPA 4.00** Storrs, CT, USA  
*Ph.D. in Machine Learning, School of Computing* *Jan. 2018 – Present*
- **Northeastern University** Shenyang, Liaoning, China  
*M.S. in Computer Science and Technology* *Sep. 2014 – Jan. 2017*
- **Northeastern University** Shenyang, Liaoning, China  
*B.S. in Computer Science and Technology* *Sep. 2010 – June 2014*

## RESEARCH EXPERIENCE

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- **University of Connecticut** Storrs, Connecticut  
*Research Assistant* *2018–Now*
  - **Ongoing work:** Develop the **dataset distillation algorithm** to select the coreset for the training of **Large Language Models (LLMs)**. Fine-tune and evaluate the LLM's performance on the **click-through rate (CTR)** prediction task, a fundamental component of recommendation systems.
  - Developed a deep neural network based on the **BERT architecture** to diagnose depression and anxiety disorder with MRI images. The corresponding research paper is nearing completion.
  - Designed and implemented Polyhedron Attention Module, an **interpretable self-attention model** for deep neural networks. Conducted experiments to show the proposed module's state-of-the-art performance on the CTR prediction task. This work was accepted by **NeurIPS 2023**.
  - Developed deep neural networks diagnosing alcohol/nicotine use disorder with MRI images, which leveraged interpretable knowledge of brain networks and alcohol/nicotine biotypes to enhance performance. Two papers of this work were published in **Translational Psychiatry 2022 (by Nature Publishing Group, Q1 journal)** and **Biological Psychiatry: Cognitive Neuroscience and Neuroimaging 2023 (Q1 journal)**.
  - Proposed a stage-wised optimization algorithm for **deep stochastic contextual bandits problem**. Performed theoretical analysis and extensive experiments to demonstrate the effectiveness and efficiency of the proposed algorithm. This work was accepted by **AAAI 2021 (Acceptance rate: 21.1%)**

## Northeastern University

*Research Assistant*

Shenyang, China

*2014–2017*

- Proposed Belief-state Monte-Carlo Tree Search, a searching framework used in imperfect information games, which was published in **IEEE Symposium on Computational Intelligence and Games 2015** and **IEEE Transactions on Games 2017**.

## WORKING PAPERS

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- [Submitted] Fei Dou, Jin Lu, *Tan Zhu*, Rigel Mahmood, Caiwen Ding, Dongjin Song, Jinbo Bi. "Latent Orthonormal Contrastive Learning for Paired Inputs." ICML, 2024.
- [Preprint Version Available Online] *Tan Zhu*, Fei Dou, Chloe Becquey, Jinbo Bi, "Identifying Interactions among Categorical Predictors with Monte-Carlo Tree Search."
- [In preparation for submission] *Tan Zhu*, Yu Chen, Chiang-Shan R Li, Jinbo Bi. "Identifying Shared Neural Markers Across Positive and Negative Valence for Depression and Anxiety."

## CONFERENCE AND JOURNAL PUBLICATIONS

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- [NeurIPS 2023] *Tan Zhu*, Fei Dou, Xinyu Wang, Jin Lu, Jinbo Bi. "Polyhedron Attention Module: Learning Adaptive-order Interactions." 37<sup>th</sup> Conference on Neural Information Processing Systems. 2023.
- *Tan Zhu*, Wuyi Wang, Yu Chen, Henry R Kranzler, Chiang-Shan R Li, Jinbo Bi. "Machine Learning of Functional Connectivity to Biotype Alcohol and Nicotine Use Disorders." Biological Psychiatry: Cognitive Neuroscience and Neuroimaging, 2023, (**Impact factor: 5.9**).
- Fei Dou, Jin Lu, *Tan Zhu*, Jinbo Bi. "On-Device Indoor Positioning: A Federated Reinforcement Learning Approach With Heterogeneous Devices." IEEE Internet of Things Journal, 2023, (**Impact factor: 9.9**).
- [Nature Publication Group] *Tan Zhu*, Chloe Becquey, Yu Chen, Carl W. Lejuez, Chiang-Shan R. Li, Jinbo Bi. "Identifying alcohol misuse biotypes from neural connectivity markers and concurrent genetic associations." Translational Psychiatry 12, no. 1 (2022): 253, (**Impact factor: 7.9**).
- Qianqian Tong, Guannan Liang, Jiahao Ding, *Tan Zhu*, Miao Pan, Jinbo Bi. "Federated Optimization of l0-norm Regularized Sparse Learning." Algorithms 15, no. 9 (2022): 319.
- [AAAI 2021] *Tan Zhu*, et al. "An Efficient Algorithm for Deep Stochastic Contextual Bandits." In Proceedings of the AAAI Conference on Artificial Intelligence, 2021.
- Liu, Qingqing, Peng-Shuai Wang, Chunjiang Zhu, Blake Blumenfeld Gaines, *Tan Zhu*, Jinbo Bi, and Minghu Song. "OctSurf: Efficient hierarchical voxel-based molecular surface representation for protein-ligand affinity prediction." Journal of Molecular Graphics and Modelling 105 (2021): 107865.
- Zhu, Chun Jiang, *Tan Zhu*, Haining Li, Jinbo Bi, and Minghu Song. "Accelerating large-scale molecular similarity search through exploiting high performance computing." In 2019 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), pp. 330-333. IEEE, 2019.
- [AAAI 2019] Chunjiang Zhu, *Tan Zhu*, Kam-Yiu Lam, Song Han, and Jinbo Bi. "Communication-optimal distributed dynamic graph clustering." In Proceedings of the AAAI Conference on Artificial Intelligence, vol. 33, no. 01, pp. 5957-5964. 2019.
- Jiao Wang, *Tan Zhu*, Hongye Li, Chu-Husan Hsueh, I-Chen Wu. "Belief-state monte Carlo tree search for phantom go." IEEE Transactions on Games, 10(2), 139-154, 2017.
- Jiao Wang, *Tan Zhu*, Hongye Li, Chu-Hsuan Hsueh, I-Chen Wu. Belief-state Monte-Carlo tree search for Phantom games. 2015 IEEE Conference on Computational Intelligence and Games (CIG), 267-274. IEEE, 2015.
- Jiao Wang, Chenjun Xiao, *Tan Zhu*, Chu-Husan Hsueh, Wen-Jie Tseng, I-Chen Wu. "Only-one-victor pattern learning in computer go." IEEE Transactions on Computational Intelligence and AI in Games, 9(1), 88-102, 2015.
- Zheng Wei, *Tan Zhu*, Tianzhang He, Shixin Liu. "A fast heuristic algorithm for ladle scheduling based on vehicle routing problem with time windows model." ISIJ International, 54(11), 2588-2597, 2014.