

# Zhenqiao Song

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## Education

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### Carnegie Mellon University

Pittsburgh, US

Jan. 2024-Now

- Ph.D. in Language Technologies Institute. Advisor: Prof. Lei Li

### University of California, Santa Barbara

Santa Barbara, US

Sep. 2022-Dec. 2023

- Ph.D. in Computer Science. Advisor: Prof. Lei Li

### Fudan University

Shanghai, China

Sep. 2017-Jun. 2020

- M.S. in Computer Science. Advisor: Prof. Xiaoqing Zheng

- Shanghai Outstanding Graduate Student

### Xiamen University

Xiamen, China

Sep. 2013-Jun. 2017

- B.S. in Computer Science. Advisor: Prof. Jinsong Su

- Ranked 3/138 peers

## Research Interests

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My research focuses on the applications of generative AI in scientific domains like biology and chemistry, with a particular emphasis on **protein design**. I'm also interested in **multilingual NLP**, including multilingual machine translation and multilingual text generation.

## Employment

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### NEC Laboratories America Intern

Princeton, US

Jun. 2024-Sep. 2024

*Machine Learning Department, working with Martin Renqiang Min*

- Research Project on Protein Complex Design

### Broad Institute of Harvard and MIT Visting Scientist Intern

Boston, US

Jun. 2023-Sep. 2023

*Eric and Wendy Schmidt Center, working with Wengong Jin*

- Research Project on Protein Design based on Protein Surface

### Bytedance AI Lab FTE

Shanghai, China

Jul. 2020- Aug. 2022

*NLP Researcher advised by Dr. Hao Zhou and Dr. Lei Li, MLNLC team.*

- Research Work on Deep Generative Models for Natural Language**

- switch-GLAT: Multilingual Parallel Machine Translation Via Code-Switch Decoder

- MTG: A Benchmarking Suite for Multilingual Text Generation

- Industrial Applications on Natural Language Generation**

- **Multilingual Advertising Title Generation**

- Implement a multilingual Ad title generation model incorporating eight languages, including English, Chinese, Japanese, Vietnamese, Russian and so on. It is used in an online advertising system of ByteDance, and the profit arises from \$4,000/day to \$200,000/day.

- **Advertisement Classification System**

- Implement an advertisement classification model incorporating over 200 categories. It achieves over 90% online average accuracy on all categories and the profit is over 4 million dollars one year.

### Bytedance AI Lab Intern

Shanghai, China

Jun. 2019-Jun. 2020

*Student Researcher advised by Jiaze Chen*

- Research Work on Deep Generative Models for advertising bidding**

- Triangular Bidword Generation for Sponsored Search Auction

- The proposed model is applied in the search system of ByteDance and achieves over \$300 million every year.

## Publications

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- [1] **Zhenqiao Song**, Yunlong Zhao, Wengong Jin, Wenxian Shi, Yang Yang, and Lei Li. “Generative Enzyme Design Guided by Functionally Important Sites and Small-Molecule Substrates”. In: *Forty-first International Conference on Machine Learning (ICML)*. 2024.
- [2] **Zhenqiao Song**, Tinglin Huang, Lei Li, and Wengong Jin. “SurfPro: Functional Protein Design Based on Continuous Surface”. In: *Forty-first International Conference on Machine Learning (ICML)*. 2024.
- [3] Tinglin Huang, **Zhenqiao Song**, Rex Ying, and Wengong Jin. “Protein-Nucleic Acid Complex Modeling with Frame Averaging Transformer”. In: *Thirty-eighth Conference on Neural Information Processing Systems (NeurIPS)*. 2024.
- [4] Kexun Zhang, Yee Man Choi, **Zhenqiao Song**, Taiqi He, William Yang Wang, and Lei Li. “Hire a Linguist!: Learning Endangered Languages with In-Context Linguistic Descriptions”. In: *Proceedings of the 62th Annual Meeting of the Association for Computational Linguistics (ACL)*. 2024.
- [5] **Zhenqiao Song** and Lei Li. “Importance Weighted Variational Bayes for Protein Sequence Design”. In: *Proceedings of the 2023 International Conference on Machine Learning (ICML)*, 2023. 2023.
- [6] **Zhenqiao Song**, Yunlong Zhao, Wenxian Shi, Yang Yang, and Lei Li. “Functional Geometry Guided Protein Sequence and Backbone Structure Co-Design”. In: *arXiv preprint arXiv:2310.04343* (2023).
- [7] **Zhenqiao Song**, Yunlong Zhao, Yufei Song, Wenxian Shi, Yang Yang, and Lei Li. “Joint Design of Protein Sequence and Structure based on Motifs”. In: *arXiv preprint arXiv:2310.02546* (2023).
- [8] Wenda Xu, Danqing Wang, Liangming Pan, **Zhenqiao Song**, Markus Freitag, William Yang Wang, and Lei Li. “Instructscore: Towards explainable text generation evaluation with automatic feedback”. In: *Proceedings of the 2023 EMNLP (EMNLP)*. 2023.
- [9] **Zhenqiao Song**, Hao Zhou, Lihua Qian, Jingjing Xu, Shanbo Cheng, Mingxuan Wang, and Lei Li. “switch-GLAT: Multilingual Parallel Machine Translation Via Code-Switch Decoder”. In: *International Conference on Learning Representations (ICLR)*. 2022.
- [10] Yiran Chen, **Zhenqiao Song\***, Xianze Wu, Danqing Wang, Jingjing Xu, Jiaze Chen, Hao Zhou, and Lei Li. “MTG: A Benchmarking Suite for Multilingual Text Generation”. In: *Proceedings of the 2022 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL Findings)*. 2022.
- [11] **Zhenqiao Song**, Jiaze Chen, Hao Zhou, and Lei Li. “Triangular Bidword Generation for Sponsored Search Auction”. In: *Proceedings of the 14th ACM International Conference on Web Search and Data Mining (WSDM)*. 2021, pp. 707–715.
- [12] **Zhenqiao Song**, Xiaoqing Zheng, and Xuanjing Huang. “Jointly learning bilingual word embeddings and alignments”. In: *Machine Translation* (2021), pp. 1–19.
- [13] **Zhenqiao Song**, Xiaoqing Zheng, Lu Liu, Mu Xu, and Xuan-Jing Huang. “Generating responses with a specific emotion in dialog”. In: *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics (ACL)*. 2019, pp. 3685–3695.
- [14] Lu Liu, **Zhenqiao Song**, and Xiaoqing Zheng. “Improving Coreference Resolution by Leveraging Entity-Centric Features with Graph Neural Networks and Second-order Inference”. In: *arXiv preprint arXiv:2009.04639* (2020).
- [15] Jinsong Su, **Zhenqiao Song**, Yaojie Lu, Mu Xu, Changxing Wu, and Yidong Chen. “Exploring Implicit Semantic Constraints for Bilingual Word Embeddings”. In: *Neural Processing Letters* 48.2 (2018), pp. 1073–1088.

## Honors and Awards

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- China National Scholarship. 2020

- Shanghai Outstanding Graduate. 2020
- Fudan University Excellent Scholarship. 2017 - 2019
- Xiamen University Excellent Scholarship. 2013 - 2017

## Academic Services

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- **Journal Reviewer:** Nature Communication, Nature Machine Intelligence, Medicine, TMLR
- **Conference Reviewer:** ACL 2020-2024, EMNLP 2020-2024, NLPCC 2022-2023, IJCAI 2023-2024, ICML2023-2024, NeurIPS 2023-2024, ICLR 2023-2024, COLM 2024
- Co-organizer of the first Generative AI and Biology workshop (GenBio) in NeurIPS 2023
- Co-organizer of the 2022 SoCal (Southern California) NLP Symposium

## Invited Talk

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- Aug. 2024: Invited talk at Tsinghua University Air Institute!
- Jul. 2024: Invited talk at Fudan University NLP Group!
- Oct. 2023: Invited talk at Jiangmen!
- May 2023: Invited talk at BytaDance Research!

## Teaching

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- **Teaching Assistant** at UCSB: CS 190I Deep Learning at Winter 2023, CS 165B Machine Learning at Spring 2023
- **Teaching Assistant** at Fudan University: Data Structures and Algorithms; Linear Algebra

## Skill Set

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- **Machine Learning API:** Tensorflow, Pytorch
- **IELTS:** 7.0