Deqian Kong (Mr.)

Personal Website

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EDUCATION

University of California, Los Angeles — Los Angeles, CA
Ph.D. candidate in Statistics, *advised by Prof. Ying Nian Wu and Prof. Song-Chun Zhu* — 09/2021-present
M.Sc. in Statistics (GPA: 4.0/4.0) — 08/2019-09/2021

Xi'an Jiaotong University — Xi'an, Shaanxi, China
B.Eng. in Automation (GPA: 3.8/4.0) — 08/2015-06/2019

RESEARCH INTEREST

Generative Modeling, Sequential Decision Making, AI for Science

PUBLICATIONS

10. **Deqian Kong**†, Dehong Xu†, Minglu Zhao†, Bo Pang, Jianwen Xie, Andrew Lizarraga, Yuhao Huang, Sirui Xie†, Ying Nian Wu. "Latent Plan Transformer: Planning as Latent Variable Inference", *In Submission to ICML 2024*.

9. **Deqian Kong**†, Yuhao Huang†, Jianwen Xie†, Edouardo Honig†, Ming Xu, Shuanghong Xue, Pei Lin, Sanping Zhou, Sheng Zhong, Nanning Zheng, Ying Nian Wu. "Dual-Space Optimization: Improved Molecule Sequence Design by Latent Prompt Transformer", *In Submission to ICML 2024*.

8. **Deqian Kong**, Furqan Khan, Xu Zhang, Prateek Singhal, Ying Nian Wu. "Long-Term Social Interaction Context: The Key to Egocentric Addressee Detection", *ICASSP 2024*.

7. **Deqian Kong**, Yuhao Huang, Jianwen Xie, Ying Nian Wu. "Molecule Design by Latent Prompt Transformer", *Neurips 2023 AI for Science Workshop*.

6. **Deqian Kong**†, Bo Pang†, Tian Han, Ying Nian Wu. "Molecule Design by Latent Space Energy-based Modeling and Gradual Distribution Shifting", *The 39th Conference on Uncertainty in Artificial Intelligence (UAI), Pittsburgh, Pennsylvania, USA*.(† Equal contribution)

5. Yan Xu†, **Deqian Kong**†, Dehong Xu, Ziwei Ji, Bo Pang, Pascale Fung, Ying Nian Wu. "Diverse and Faithful Knowledge-grounded Dialogue Generation via Sequential Posterior Inference", *The 40th International Conference on Machine Learning(ICML), Honolulu, Hawaii, USA.* († Equal contribution)

4. Shi Feng, **Deqian Kong**, Nandini Trivedi. "A statistical approach to topological entanglement: Boltzmann machine representation of higher-order irreducible correlation", *In submission to SciPost Physics*, *arxiv:2302.03212*.

3. **Deqian Kong**†, Bo Pang†, Ying Nian Wu. "Unsupervised Meta-Learning via Latent Space Energy-based Model of Symbol Vector Coupling", *5th Workshop on Meta-Learning at NeurIPS 2021*.(† Equal contribution)

2. Yixin Chen, Qing Li, **Deqian Kong**, Yik Lun Kei, Tao Gao, Yixin Zhu, Song-Chun Zhu, Siyuan Huang . "YouRefIt: Embodied Reference Understanding with Language and Gesture", *The IEEE International Conference on Computer Vision (ICCV) 2021*.(**oral**)

1. Yang Feng†, **Deqian Kong**†, Ping Wei, Hongbin Sun, Nanning Zheng, "A Benchmark Dataset and Multi-Scale Attention Network for Semantic Traffic Light Detection", *the 2019 IEEE Intelligent Transportation Systems Conference (ITSC) 2019*, Auckland, New Zealand, 2019. († Equal contribution)

WORK EXPERIENCE

Biomap — Remote
Mentors: Jianwen Xie, Le Song — 10/2023-12/2023
Project: Protein backbone generation using langauge models.

- Treat backbone generation as a sequnce generation problem using large language models. Carefully designed the tokenizer for each element to maintain rotation and translation invarianece.

Amazon Alexa AI — Sunnyvale, CA
Mentors: Feiyang Niu, Suhaila Shakiah, Feng Gao — 6/2023-9/2023
Project: Pre-train vision-language foundation model for open vocabulary segmentation.

- Leveraging the capabilities of foundation models and large-scale datasets, both public and proprietary, we propose a training approach that uses weaker supervision. Specifically, we use an 'object list' as an alternative to more costly, high-fidelity segmentation annotations.
- We approach segmentation as a problem of matching between two sets. To this end, the model is trained using the Hungarian algorithm to optimize the matching process.

Amazon Alexa AI Los Angeles, CA
Mentors: Furqan Khan, Xu Zhang 6/2022-12/2022
Project: Are you talking to me? Towards embodied social context understanding.

- Talking To Me detection is defined as given egocentric video and audio clip, classify each visible face is talking to the camera wearer or not.
- In order to capture the utterance and non-verbal cues from the spatial and temporal interactions, we introduce additional modality from audio transcriptions and build a multi-turn dialogue system (MTDS) based on that. The visual and audio features are also included in MTDS using a large vision-audio-text transformer.
- Our method have 20% performance gains comparing to previous baseline.

RESEARCH EXPERIENCE

Learning Top-down Generative model UCLA, CA
Advised by Prof. Ying Nian Wu 7/2021-present

- We propose to develop a top-down model designed for abstraction and reasoning. In this framework, regularities and rules are interpreted as statistical models within a specific latent space. We have devised sampling methods that are applicable to both continuous and discrete spaces. These methods are capable of generating sequences, images, and graphs.
- A top-down model that incorporates a generator, a learnable prior model, and a surrogate reward model can be effectively used to shift the learned distribution. This makes it applicable to a wide range of general optimization tasks, including but not limited to molecular design, combinatorial optimization, and reinforcement learning tasks.

Faithful and Diverse Langauge Models UCLA, CA
Advised by Prof. Ying Nian Wu 9/2022-present

- Propose to build an explicit latent space for existing language models. This model can be learned by EM-type alternating optimization scheme. . This latent space aims to encapsulate the uncertainty and regularities inherent in language, enabling the generation of diverse outputs while mitigating hallucination issues.
- Integrating this latent space with a value function (Q function) allows for preference alignment, controlled generation, and efficient handling of long-context scenarios directly within this latent space.

PRFESSTIONAL EXPERIENCE

Reviewer: IJCAI 2024, CVPR 2024, ICLR 2024, AAAI 2024, Neurips 2023, AISTATS 2021-2023, ICPR 2021, Stat, TMLR

Teaching Assistants in UCLA: STAT 231A, STATS 101C, STATS 10, STATS 102B, MAS 405