Juncheng Wan

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Education

Shanghai Jiao Tong University **Shanghai, China**
- M.Eng in Computer Science 2020.9 - 2023.3
- Supervised by *Prof. Weinan Zhang* and *Prof. Yong Yu*

Shanghai Jiao Tong University **Shanghai, China**
- B.E. in Information Security (minor in **Mathematics**) 2016.9 - 2020.7
- Zhiyuan Honors Program of Engineering (**Top 5%**)
- **GPA: 3.84/4.3** **Rank: 6th/104** [*proof*], **2nd/104** in senior [*proof*]

Selected Courses

Analysis: Complex Analysis, Functional Analysis, Measure Theory, Probability Theory, Stochastic Process

Algebra: Representation Theory[*pdf*], Commutative Algebra†[1], Category Theory and Homology Algebra

Geometry: Smooth Manifold†[*pdf*], Lie Group and Lie Algebra[*pdf*], Algebraic Topology, Algebraic Geometry[*pdf*]

Combinatorics: Algorithm and Complexity[*pdf*], Combinatorics, Graph Theory, Morden Graph Theory[*pdf*]

Research Experiences

Topological Combinatorics 2024.9 - 2024.11
Research Assistant, advisor *Prof. Yaokun Wu*, School of Mathematical Sciences, SJTU[2]
- In 2016, Alishahi and Hajiabolhassan proved a generalization of Gale's lemma and presented another proof of m-th multichromatic number of the s-stable Kneser graph $\chi_m(\mathrm{KG}(n,k)_s) = n - sk + sm$. We extended their generalization from simple alternating sequence to f-period alternating sequence.

Graph Diffusion Models 2022.10 - 2023.3
Research Assistant, advisor *Prof. Yuguang Wang*, School of Mathematical Sciences, SJTU
- Understand the dynamics of neural graph models, including Allen-Cahn message passing. Treat graph models with neural diffusion equations on graph and interacting particle system. Implement a code base for several graph neural ordinary differential equation solvers with PyTorch for a fair comparison.

Algebraic Methods in Combinatorics 2022.9 - 2023.1
Course Participant in Algebraic Geometry, School of Mathematical Sciences, SJTU
- Survey two applications of Algebraic Geometry in Combinatorics. 1) Alon's Combinatorial Nullstellensatz used to prove Chevalley-Warning theorem, Cauchy-Davenport theorem, and some graph problems. 2) The Lang-Weil Bound used to construct probability measure with certain property and to improve the proof in extremal problem.

Graph Game Theory 2019.12 - 2020.7
Research Assistant, advisor *Prof. Yaokun Wu*, School of Mathematical Sciences, SJTU
- In 2019, Cox and Sanaei made two conjectures: 1) For any given $r \in (0,1)$, there is a series of graphs such that the ratio of the damage number and the capture time approaches r. 2) For Paley graph $\mathcal{P}_n$, the damage number equals $\frac{n-1}{2}$ when $n \geq 13$. We proved Conjecture 1 fully. We also proved Conjecture 2 in the case that $n = 13$. [*pdf*]

Graph in Text Generation 2018.10 - 2023.3
Leader of Natural Language Processing Group, advisors *Prof. Weinan Zhang* and *Prof. Yong Yu*, *APEX Lab*, SJTU
- Generate description of graph-structured knowledge base by optimizing the inverse Kullback–Leibler divergence.
- Recognize nested named entity with self-designed entity-entity graph and span-entity graph.

Industrial Experiences

TikTok, ByteDance **Shanghai, China**
Machine Learning Engineer, Video Recommendation Algorithm 2023.4 - Now
- Work as a full-time employee for the recommender algorithms of 10 billions of e-commerce videos in TikTok. Design algorithms for recall and fine-rank stages, including rule-based methods and neural networks models.

Taobao, Alibaba **Hangzhou, China**
Research Intern, Product Recommendation Algorithm 2022.6 - 2022.10
- Design a graph for labels in loss for negative feedback prediction of 10 billions of products on Taobao. The hit rate of negative feedback increased by 1‰. Implement a code base for Multi-interest Contextualized Feedback Network.

[1] Auditioned course
[2] Shanghai Jiao Tong University

AI-Lab, ByteDance **Shanghai, China**
Research Intern, Machine Unlearning, advisor *Prof. Dell Zhang* 2021.11 - 2022.5
- Explore 2nd-order optimization algorithms, including Newton Conjugate Gradient, Gauss Newton, Generalized Lanczos Trust-Region Newton, Ada Hessian, Hessian Free Newton, and Ad Hoc Newton, for machine unlearning.

Microsoft Research Asia, Microsoft **Beijing, China**
Research Intern, Machine Translation, advisors *Shuming Ma* and *Dongdong Zhang* 2019.7 - 2020.1
- Propose a noise-filtering approach from the knowledge base and extracts fragments for translation assistance.
- Propose a phrase-level gradient-based adversarial example method to enhance the robustness of translation.

Publications

Named Entity Recognition with Span-level Graphs. [*pdf*][*code*]
- **Juncheng Wan**, Dongyu Ru, Weinan Zhang, Yong Yu.
- Annual Meeting of the Association for Computational Linguistics (ACL 2022).

Phrase-level Adversarial Example Generation for Neural Machine Translation. [*pdf*][*code*]
- **Juncheng Wan***[1], Jian Yang*, Shuming Ma, Dongdong Zhang, Weinan Zhang, Yong Yu, Zhoujun Li.
- International Conference on Computational Linguistics (COLING 2022), **Oral**.

Learning to Select Relevant Knowledge for Neural Machine Translation. [*pdf*][*code*]
- Jian Yang*, **Juncheng Wan***, Shuming Ma, Haoyang Huang, Dongdong Zhang, Yong Yu, Zhoujun Li, Furu Wei.
- International Conference on Natural Language Processing and Chinese Computing (NLPCC 2021).

Triple-to-Text: Converting RDF Triples into High-Quality Natural Languages via Optimizing an Inverse KL Divergence. [*pdf*][*code*]
- Yaoming Zhu, **Juncheng Wan**, Zhiming Zhou, Liheng Chen, Lin Qiu, Weinan Zhang, Xin Jiang, Yong Yu.
- International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR 2019).

Smart-Start Decoding for Neural Machine Translation. [*pdf*][*code*]
- Jian Yang, Shuming Ma, Dongdong Zhang, **Juncheng Wan**, Zhoujun Li, Ming Zhou.
- North American Chapter of the Association for Computational Linguistics (NAACL 2021).

Forgetting Fast in Recommender Systems. [*pdf*]
- Wenyan Liu*, **Juncheng Wan***, Xiaoling Wang, Weinan Zhang, Dell Zhang, Hang Li.
- ArXiv 2022.

Honors and Awards

Honors
- Outstanding Graduate 2023
- **Zhiyuan Honor Degree of Bachelor of Engineering** (**Top 1%**) 2020

Scholarships
- **National Scholarship** (**Top 0.2%**) 2022
- First-class Academic Excellence Scholarship 2021
- **Zhiyuan College Honored Scholarship** (**Top 5%**) 2017, 2018, 2019
- Second-class Academic Excellence Scholarship 2017, 2018

Teachings

Teaching Assistant: CS214 Algorithm and Complexity 2021, 2022

[1] co-first author