Juncheng Wan

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Education

Shanghai Jiao Tong University — **Shanghai, China**
M.Eng in Computer Science (*advisors Prof. Weinan Zhang and Prof. Yong Yu, APEX Lab*) — *Sep. 2020 - Mar. 2023*

Shanghai Jiao Tong University — **Shanghai, China**
B.E. in Information Security (*major, Zhiyuan Honor Track*) — *Sep. 2016 - Jul. 2020*
B.S. in Mathematics (*minor*) — *Sep. 2018 - Jul. 2020*
Overall GPA: 3.84/4.3, ranked 6/104 [*proof*] (*ranked 2/104 in the senior year* [*proof*])

Math Courses

Undergraduate (22 courses taken), Graduate (symbol †, 12 courses taken), Auditioned (symbol *, 3 courses taken).

Analysis: Advanced Mathematics(I), Mathematical Analysis(II), Ordinary Differential Equation, Partial Differential Equation, Real Functions, Complex Functions, Measure Theory and Probability†, Stochastic Process†.

Algebra: Linear Algebra, Advanced Algebra(II) (A+), Abstract Algebra, Mathematical Foundations in Information Security(I), Mathematical Foundations in Information Security(II) (A+), Representation Theory of Group and Algebra[pdf], Commutative Algebra*(IIT online course), Category Theory and Homology Algebra†.

Geometry: Differential Geometry, General Topology*, Differential Manifold*†, Lie Group and Lie Algebra†[pdf], Algebraic Topology†, Algebraic Geometry†[pdf].

Combinatorics: Discrete Mathematics, Combinatorics, Graph Theory†, Morden Graph Theory†[pdf].

Application: Probability Theory (A+), Random Simulation, Numerical Analysis, Basic Statistics†, Convex Optimization† (A+), Advanced Computing Methods†.

Mathematics Graduate Thesis: A Study of Damage Number in Cop Robber Game (A+, [pdf]).

Mathematics Experiences

School of Mathematical Sciences, SJTU — **Shanghai, China**
Research Assistant, ODE in Graph Neural Networks, advisor Prof. Yuguang Wang — *Oct. 2022 - Mar. 2023*

- Understand the dynamics of ODE in graph neural networks (GNN), including Allen-Cahn message passing. Treat GNN with neural diffusion equations on graph and study the neural equations of interacting particle system. Implement a code base for several graph neural ODE solvers with PyTorch for a fair comparison.

University of London && ByteDance AI-Lab — **Shanghai, China**
Research Assistant, Optimization in Machine Unlearning, advisors Prof. Dell Zhang and Hang Li — *Nov. 2021 - May. 2022*

- Design 2nd-order algorithms for machine unlearning. Try 2nd-order algorithms, including BFGS, L-BFGS, CG, Newton CG, Trust-Region NCG, Generalized Lanczos Trust-Region Newton, Gauss-Newton, and AdaHessian. Select Hessian Free Newton and Ad Hoc Newton for warm-start algorithms to approximate the effect of retraining.

School of Mathematical Sciences, SJTU — **Shanghai, China**
Research Assistant, Graph Theory, advisor Prof. Yaokun Wu — *Dec. 2019 - Jul. 2020*

- 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 $n \geq 13$. I proved Conjecture 1 fully. I also proved Conjecture 2 in the case that $n = 13$.

Industrial Experiences

TikTok, ByteDance — **Shanghai, China**
Machine Learning Engineer, E-commerce Video Recommendation Algorithm — *Apr. 2023 - Now*

- Work as a full-time employee for the recommender system of 10 billions of e-commerce videos in TikTok. Responsible for parts of recall and fine-rank stages, including the design of rule-based methods and neural networks.

Taobao, Alibaba — **Hangzhou, China**
Research Intern, Product Recommendation Algorithm, advisors Qiwei Chen and Tao Zhuang — *Jun. 2022 - Oct. 2022*

- Design a DAG-based 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.

Microsoft Research Asia (MSRA), Microsoft — **Beijing, China**
Research Intern, Machine Translation, advisors Shuming Ma and Dongdong Zhang — *Jul. 2019 - Jan. 2020*

- Explore decoding for translation by predicting a median word and then decoding words on the two sides.

- 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.

APEX Data & Knowledge Management Lab, SJTU **Shanghai, China**
Group Leader, Natural Language Processing, advisors Prof. Weinan Zhang and Prof. Yong Yu *Jun. 2018 - Mar. 2023*

- Generate more natural language description of the knowledge base with a Triple-to-Text framework, which approximately optimizes the inverse KL divergence between the distributions of the real and generated sentences.
- Recognize nested named entity by a span-based method with a pre-trained model and graph convolutional networks, which capture the n-gram features with the entity-entity graph and span-entity graph globally.

Publications

Named Entity Recognition with Span-level Graphs. [pdf][code]
- **Juncheng Wan**, Rongyu 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***(co-first author), 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***(co-first author), 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***(co-first author), Xiaoling Wang, Weinan Zhang, Dell Zhang, Hang Li.
- Preprint 2022.

Honors and Awards

Outstanding Graduate of SJTU 2023

National Scholarship (around 0.2% student in China) 2022

First-class Academic Excellence Scholarship of SJTU 2021

Zhiyuan Honor Degree of Bachelor of Engineering (awarded for 50 students in SJTU) 2020

Zhiyuan Honorary Scholarship (awarded for top 5% students in SJTU) 2017, 2018, 2019

Second-class Academic Excellence Scholarship of SJTU 2017, 2018

Teachings

Teaching Assistant: CS214 Algorithm and Complexity 2021, 2022

Skills

Programming: C/C++, HSQL, Java, LaTeX, Matlab, Python, Verilog.

Language: TOEFL 101 (Speaking 22).