Fan-Yun **Sun**

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Research Interests

Machine learning and deep Learning for graph-structured Data, network mining and analysis, reinforcement learning and multi-agent systems

Education

Stanford University — *Palo Alto, U.S.A*

Ph.D in Computer Science — *09/2020 -*

National Taiwan University (NTU) — *Taipei, Taiwan*

B.S. in Computer Science and Information Engineering — *09/2015 - 06/2019*

- **GPA: 4.20 / 4.30, major GPA: 4.28 / 4.30**
- **Class Rank: 3 / 123**

Research & Work Experience

***Visiting Student Researcher*, Stanford University,** Prof. Jure Leskovec — *Palo Alto, U.S.A*

Data mining on temporal graphs for computer systems — *07/2019 - 10/2019*

- Conducted log mining on a dynamic communication system (data mining on temporal graphs).
- Researched and implemented models that aim to discovery high order causalities/dependencies.

***Research Intern*, Montreal Institute for Learning Algorithms (MILA),** Prof. Jian Tang — *Montreal, Canada*

vGraph: A Generative Model for Joint Community Detection and Node Representation Learning [**NeurIPS-19**] — *01/2019 - 05/2019*

- Proposed a generative model that models community assignment as discrete latent variable and is optimized using variational inference.
- Outperformed state-of-the-art baselines in both community detection tasks and node classification tasks.

InfoGraph:Unsupervised and Semi-supervised Graph-Level Representation Learning via Mutual Information Maximization [**ICLR-20**]

- Proposed to adopt mutual information maximization techniques for both unsupervised and semi-supervised whole graph learning.
- Outperformed baselines in both unsupervised graph classification and semi-supervised molecular property prediction tasks (QM9).

***Research Assistant*, Multimedia Indexing, Retrieval, and Analysis Lab,** Prof. Winston Hsu — *Taipei, Taiwan*

Organ At Risk Segmentation with Multiple Modality — *01/2018 - 12/2018*

- Proposed to use GAN to improve segmentation performance on medical images with multiple modalities.
- Researched and implemented Faster-RCNN and Mask-RCNN.

Neural Network as Neural Network Input

- Existing benchmark graph datasets are limited to social networks, citation networks, or bioinformatic datasets. In this paper, we extend the realm of graph benchmark datasets to computation graphs of neural networks.

***Machine Learning Engineer Intern*, Appier** — *Taipei, Taiwan*

- Researched and implemented RNN-based and graph-based recommendation methods using real world datasets. — *03/2018 - 09/2018*

***Undergraduate Researcher*, Machine Discovery & Network Mining Lab,** Prof. Shou-De Lin — *Taipei, Taiwan*

A Regulation Enforcement Solution for Multi-agent Reinforcement Learning [**AAMAS-19**] — *03/2017 - 09/2018*

- Proposed a regulation enforcement solution for normative multi-agent systems.
- Utilized empirical game-theoretic analysis to show that our method makes mutual compliant the new Nash Equilibrium.

Designing Non-greedy Reinforcement Learning Agents with Diminishing Reward Shaping [**AIES-18 (Oral)**]

- Proposed a cost-effective method to train non-greedy reinforcement learning (RL) agents.
- Conducted multi-agent RL simulations to prove that our method achieved non-homogeneous equality.

A Memory-Network Based Solution for Multivariate Time-Series Forecasting

- Proposed a memory network-based model for time series prediction with interpretable attention mechanism.
- Outperformed state-of-the-art baselines in both univariate and multivariate time series prediction.

Adaptive Network Scaling for Deep Rectifier Reinforcement Learning Models

- Provided a thorough study on how reward scaling can affect performance of deep reinforcement learning agents.
- Proposed an adaptive network scaling framework to find a suitable scale of rewards during learning for better performance.

***Quantitative Research Intern*, WorldQuant** — *Taipei, Taiwan*

- Achieved gold level distinction (ranked highest out of all interns). — *01/2018 - 02/2018*

***Microsoft Student Partner*, Microsoft** — *Taipei & Seattle, Washington*

- Workshop lecturer on machine learning and deep learning. — *09/2017 - 06/2018*
- Attended Microsoft Build Conference as the representative for Taiwan.

***Software Engineering Intern*, Google** — *Taipei, Taiwan*

- Developed full stack applications for Android Team's project Treble. — *07/2017 - 09/2017*

Publications

1. **Fan-yun Sun**, Meng Qu, Jordan Hoffman, Chin-Wei Huang, Jian Tang "vGraph: A Generative Model for Joint Community Detection and Node Representation Learning", in proceedings of ***Conference on Neural Information Processing Systems (NeurIPS 2019)***
2. **Fan-Yun Sun**, Jordan Hoffman, Vikas Verma, Jian Tang, "InfoGraph: Unsupervised and Semi-supervised Graph-Level Representation Learning via Mutual Information Maximization", ***International Conference on Learning Representations (ICLR 2020) (Spotlight)***.
3. **Fan-Yun Sun**, Yen-Yu Chang, Yueh-Hua Wu, Shou-De Lin, "A Regulation Enforcement Solution for Multi-agent Reinforcement Learning", in proceedings of ***International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS 2019)***
4. **Fan-Yun Sun**, Yen-Yu Chang, Yueh-Hua Wu, Shou-De Lin, "Designing Non-greedy Reinforcement Learning Agents with Diminishing Reward Shaping", in proceedings of ***AAAI/ACM conference on AI, Ethics, Society 2018 (Oral)***
5. Yen-Yu Chang, **Fan-yun Sun**, Yueh-Hua Wu, Shou-De Lin, "A Memory-Network Based Solution for Multivariate Time-Series Forecasting", ***Preprint Arxiv:1809.02105 2018***
6. Yueh-Hua Wu, **Fan-yun Sun**, Yen-Yu Chang, Shou-De Lin, "ANS: Adaptive Network Scaling for Deep Rectifier Reinforcement Learning Models", ***Preprint Arxiv:1809.02112 2018***
7. Kuan-Lun Tseng, Winston Hsu, Chun-ting Wu, Ya-Fang Shih, **Fan-Yun Sun**, "Organ At Risk Segmentation with Multiple Modality", ***Preprint Arxiv:1910.07800 2018***

Honors & Awards

(complete list at https://fanyun-sun.github.io/#awards)

2019 **Appier Scholarship**, Travel grant for NeurIPS 2019
2018 **Ranked 19th / 4180 teams**, KDD CUP - Main Track
2018 **Ranked 4th / 4180 teams**, KDD CUP - Long Term Prediction Track
2018 **Research Project Grant**, Institute for Information Industry of Taiwan
2018 **Intern of the year Award**, Microsoft Student Partner
2017 **Finalist (Top 12)**, Formosa Response Selection Chatbot Competition
2017 **Top 1000**, Google Code Jam
2016 **1st Place**, ACM ICPC Regional Contest
2016 **2nd Place**, Newcomers for ACM-ICPC Taiwan Online Programming Contest
2016 **3rd Place**, NTU ACM ICPC Ranking
2017 **Best Project Award**, Probability - Final Project Contest
2016 **Ranked 3rd/280+ students**, Data Structure and Algorithm - Final Project Contest
15,16 **Presidential Awards**, National Taiwan University
2014 **Finalist (Top 30)**, International Physics Olympiad Domestic Final

Teaching & Presentation

(slides available at https://fanyun-sun.github.io/#teaching)

Teaching Assistant, **Data Structures and Algorithms (Spring 2017)**, Prof. Jyh-Shing Roger Jang — *02/2017 - 06/2017*
Workshop Lecturer, **Intro to deep learning and frameworks compared**, Microsoft Student Partner — *10/2017*
Presenter, **Drug Discovery & Graph Neural Networks**, MILA Graph Reading Group — *04/2019*

Selected Side Projects

(complete list at https://fanyun-sun.github.io/#projects)

Intelligent Conversational Bot of TV / Movie — *2017*
- Designed and implemented an AI chatbot of TV / Movie.
- Involved in crawling data, training language understanding models and seq2seq natural language generation models, and experimenting RL-based dialogue tracker.

Response Selection Chatbot — *2017*
- Our solution is an ensemble of the following three models: a Sequential Matching Network, a RNN model, and a model that averages word vectors.

E-monitor — *2017*
- Implemented an Android app that integrates with IOT devices to monitor electronic devices in real-time.

Activities

***Tech Director*, NTU Student Association** — *2018 - 2019*
- Manage websites and provide services to all NTU students.

***Chair*, Alumni Association Performance Night** — *2017*
- Organized annual performance night for alumni association involving 100+ participants.

Skills

Natural Languages English, Chinese (Mandarin)
Operating Systems GNU/Linux (Ubuntu & Arch Linux), Mac OSX, Windows
Programming Languages Python, C/C++, Shell, Git, Java, Javascript, Matlab, LaTeX
Deep Learning Libraries Pytorch, Tensorflow, Keras