Fan-Yun **Sun**

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Research Interests

Machine learning and Deep Learning for Graph-structured Data, Network and Data Mining, Reinforcement Learning and Multi-agent systems, AI for Healthcare

Education

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**
- **Machine Learning**: Probability, Artificial Intelligence: Principles and Techniques, Machine Learning*, Machine Learning: Theory and Practice*, Intelligent Conversational Bot*, Intro. to Digital Speech Processing, Multimedia Analysis and Indexing*.
- **Algorithm**: Data Structure and Algorithms, Algorithm Design and Analysis, ACM-ICPC.

(* denotes graduate-level courses)

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 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 (See Publication #1.) [**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 (See Publication #2.)

- 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 (See Publication #7) *01/2018 - 12/2018*

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

Neural Network as Neural Network Input

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

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

- Researched and implemented RNN-based and graph-based recommendation methods on real world dataset. *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 (See Publication #3) [**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 make mutual compliant the new Nash Equilibrium.

Designing Non-greedy Reinforcement Learning Agents with Diminishing Reward Shaping (See Publication #4) [**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 (See Publication #5)

- 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 (See Publication #6)

- Provided a thorough study on how reward scaling can affect performance of deep reinforcement learning agents.
- Propose an Adaptive Network Scaling framework to find a suitable scale of the rewards during learning for better performance.

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

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

***Microsoft Student Partner*, Microsoft** *Taipei, Taiwan & Seattle, U.S.A*

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

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

- Develop 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", **in submission of International Conference on Learning Representations (ICLR 2020)**.
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 **Presendential 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*
***Presenter*, AI Ethics and Diminishing Reward Shaping**, Lab Group Meeting (Prof. Shou-De Lin) *10/2017*
***Workshop Lecturer*, Intro to deep learning and frameworks compared**, Microsoft Student Partner *10/2017*
***Presenter*, Introduction to ML/DL on graphs - Graph Convolution**, Lab Group Meeting (Prof. Winston Hsu) *06/2018*
***Presenter*, Semi-Supervised Learning & Multi-Task Learning**, MILA Lab Group Meeting (Prof. Jian Tang) *04/2019*
***Presenter*, Drug Discovery & Graph Neural Networks**, MILA Graph Reading Group *04/2019*
***Presenter*, Variational Inference & Discrete Latent Structure**, MILA Lab Group Meeting (Prof. Jian Tang) *04/2019*
***Presenter*, vGraph (my NeurIPS paper)**, Stanford Lab Group Meeting (prof. Jure Leskovec) *09/2019*

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, experimenting RL-based dialogue tracker and seq2seq model for natural language generation.

Extracurricular Activity

***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.

***Participants*, MakeNTU Hackathon** *2017*

- Implemented an android app integrated with IOT device to monitor electronic devices in real-time.

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