

Fan-Yun Sun

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Research Interests

Machine learning and deep learning for graph-structured data (Graph representation learning), Network Mining and Analysis, Reinforcement Learning and Multi-agent systems, Medical Imaging

Education

National Taiwan University (NTU)

Taipei, Taiwan

B.S. IN COMPUTER SCIENCE AND INFORMATION ENGINEERING

09/2015 - 06/2019

- **GPA: 4.20/4.3 (Top 3%)**, major GPA: 4.28/4.30
- **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 FOR ON TEMPORAL GRAPHS FOR COMPUTER SYSTEMS

07/2019 - 10/2019

- Conducted log mining on dynamic communication system (data mining on temporal graphs)
- Proposed a graph attention neural network to detect anomalies and 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.
- Attended Microsoft Build Conference as the representative of Taiwan.

09/2017 - 06/2018

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>)

- 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
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) , 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 Lead, 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)
Programming Languages	Python, C/C++, Shell, Git, Javascript, Matlab, \LaTeX
Deep Learning Libraries	Tensorflow, PyTorch, Keras