

Yuhang Yao

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Carnegie Mellon University

EDUCATION

Carnegie Mellon University

Aug. 2019 - Present

Ph.D. in LIONS Lab, Dept. of Electrical and Computer Engineering

- Overall GPA: 4.0/4.0. Advisor: Prof. Carlee Joe-Wong.

Shanghai Jiao Tong University

Sept. 2015 - Jun. 2019

B.S. in Computer Science, IEEE Honor Class

- Major GPA: 3.78/4.0.

PUBLICATIONS

- **Yuhang Yao**, Carlee Joe-Wong, “Interpretable Clustering on Dynamic Graphs with Recurrent Graph Neural Networks”, in *AAAI 2021*.
- **Yuhang Yao**, Xiao Zeng, Tianyue Cao, Luoyi Fu and Xinbing Wang, “APRP: An Anonymous Propagation Method in Bitcoin Network”, in *AAAI 2019 poster*.
- **Yuhang Yao**, Junjie Ou, Yang Li, Luoyi Fu, Xinbing Wang and Guihai Chen, “Turing Index: Cross-domain and Cross-generation Metric of Unraveling Scholars’ Impact in Academic Big Data”, in *Big Data Research 2019*.
- Jiaqi Liu, **Yuhang Yao**, Xinzhe Fu, Luoyi Fu and Xinbing Wang, “Evolving K-Graph: Modeling Hybrid Interactions in Networks”, in *ACM MobiHoc 2017 poster*.
- Jiayu Pan, **Yuhang Yao**, Luoyi Fu and Xinbing Wang, “Core Percolation in Coupled Networks”, in *ACM MobiHoc 2017 poster*.
- Xudong Wu, Luoyi Fu, **Yuhang Yao**, Xinzhe Fu, Xinbing Wang and Guihai Chen, “GLP: A novel Framework for Group-level Location Promotion”, in *IEEE/ACM Trans. on Networking 2018*.
- Jiaqi Liu, Luoyi Fu, **Yuhang Yao**, Xinzhe Fu, Xinbing Wang and Guihai Chen, “Modeling, Analysis and Validation of Evolving Networks with Hybrid Interactions”, in *IEEE/ACM Trans. on Networking 2018*.
- Jiapeng Zhang, Luoyi Fu, Shuhao Li, **Yuhang Yao**, Xinbing Wang, “Core Percolation in Independent Networks”, in *IEEE Trans. on Network Science and Engineering 2018*.

RESEARCH EXPERIENCES

Interpretable Clustering on Dynamic Graphs with Recurrent Graph Neural Networks

Nov. 2019 - Present

Advisor: Prof. Carlee Joe-Wong

LIONS Lab

- Proposed a dynamic stochastic block model that captures the changes, and a simple decay-based clustering algorithm that clusters nodes based on weighted connections between them;
- Analyzed the optimal decay rate for each cluster theoretically and proposed a clustering method that achieves almost exact recovery of the true clusters with optimized decay rates;
- Proposed two new RNN-GCN architectures that use an interpretable RNN layer to capture the dynamics of evolving graphs and GCN layers to cluster the nodes.
- Demonstrated that the proposed architectures perform well on both real and simulated datasets compared to state-of-the-art graph clustering algorithms.

Smart Data Pricing for Edge Computing

Aug. 2019 - Present

Advisor: Prof. Carlee Joe-Wong

LIONS Lab

- Derived a model to describe pricing, resource allocation and relationship migration for heterogeneous edge servers, providers and users;
- Established strategy evaluation on pricing and service quality, especially on lower latency to maximum the expected market size with competition among server providers;

- Analysed the optimal strategy for late comers to catch up with early comers and gain more market share under budget constraint and user dependence;
- Built experiment on both simulated and real edge dataset to demonstrate the validation and accuracy of the model.

Turing Index: A Cross-domain & Cross-generation Metric of Unraveling Scholars' Impact

Mar. 2018 - June. 2019

Advisor: Prof. Xinbing Wang

Research Center of Intelligent Internet of Things

- Derived a novel metric named Turing index that captures scholars' impact across different domains and generations;
- Investigated data collected from 14,223,183 scholars, 126,438,664 papers, 533,556,856 references and 310 domains spanning from 1865 to 2016, and applied the Power Law to citation distributions of scholars across different domains and generations;
- Normalized multifarious citation distributions using the inflation adjustment factor that quantifies the absolute status of scholars to eliminate the effect of rapid inflation;
- Established a system containing 12 billion scholars' Turing index data to compare cross-domain and cross-generation scholars.

APRP: An Anonymous Method in Blockchain

Feb. 2018 - Sep. 2018

Advisor: Prof. Xinbing Wang

Research Center of Intelligent Internet of Things

- Presented a general adversarial network model for formulizing deanonymization attacks;
- Designed a novel propagation method called APRP(Adaptive PageRank Propagation) that adopts PageRank as a propagation delay factor and constantly adjusts the PR-value of nodes to adapt to network dynamics;
- Experimented on both simulated and real Bitcoin networks, and confirmed the superiority of APRP which increased performance by 20% to 50% under various deanonymization attacks.

Core Percolation and Influence Maximization in Social Networks

Aug. 2016 - Feb. 2018

Advisor: Prof. Xinbing Wang

Research Center of Intelligent Internet of Things

- Studied the core percolation (a fundamental structural transition resulting from preserving core nodes in the network) and influence maximization in multiple interdependent networks;
- Proposed GLR, an alternating greedy leaf reduction method, which recursively switches among networks for node removal, and GLP, a new and novel framework of group-level location promotion in Geo-Social Networks;
- Extensive experiments on real datasets demonstrate that the GLP outperforms four baselines, with notably up to 10 times larger influence spread and 100 times faster seed selection over two individual-level cases.

SELECTED PROJECTS

Distributed Machine Learning by Spark

Jan. 2020 - June. 2020

Advisor: Prof. Greg Ganger

- Developed a distributed machine learning system for large scale datasets based on pyspark;
- Perform super efficient distributed gradient descent on a KDD Cup 2012 dataset with 54,686,452 features and a binary click-through prediction dataset released by Criteo with 882,774,562 features;
- Achieve 60x speedup per iteration over a single machine.

Expert Portrayal in Academic Networks

Sept. 2018 - June. 2019

Group Leader

- Created accurate expert portraits and visualizations of scholars in NSF and NSFC;
- Used the Turing index to describe the inflation of domain and times in funding evaluations;
- Studied the career trajectory of scholars from bachelor degrees, PhDs, to faculty terms;
- Site Url: <http://acemap.info/>.

SKILLS

Programming

Python, C/C++, HTML, SQL, Scala

Tools

PyTorch, Apache Spark, TensorFlow, L^AT_EX.