

CHAOYANG HE

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RESEARCH AREAS: SYSTEM × ML

SysML - end-to-end machine learning algorithms and systems at scale, which lies at the intersection of machine learning, distributed system, mobile/IoT systems, cloud computing, and blockchain. My recent focus is:

1. **DistML**: distributed training for massive-scale DNNs (e.g., Transformers, MoE, Pathways)
2. **FedML**: federated learning algorithms, systems, and applications in CV, NLP, Data Mining (GNN), and IoT.

PRODUCT AND ENGINEERING: REAL-WORLD IMPACT

I am also interested in building **Internet Products** and **open-source libraries**. I've built products for many vertical industries, including Cloud Computing, Distributed ML Systems, Connected and Autonomous Vehicles, Taxi-calling Service, Maps/Navigation/location-based services (LBS), Speech Recognition, Music, Games, etc.

EDUCATION

University of Southern California August 2018 - March 2022
Ph.D. in Computer Science, Viterbi School of Engineering Los Angeles, California, USA

- Advisor: [Salman Avestimehr](#) (USC), [Mahdi Soltanolkotabi](#) (USC); Co-Advisor: [Tong Zhang](#) (HKUST)
- PhD Thesis: *Federated and Distributed Machine Learning at Scale: from Systems to Algorithms to Applications*
- Quantitative Summary: 2 PhD Fellowships and 2 Best Paper Awards; 30+ Publications; H-index 13+; Citations 2400+; Professional Reviews 100+; Invited Talks 5+; Community Users 1000+; fundraising 2M+ USD

WORKING EXPERIENCE / EMPLOYMENT

FedML Inc. (<https://FedML.ai>) Feb 2022 - Present
Co-founder and CTO California, USA

Tencent (ai.tencent.com) November 2018 - February 2019
Tencent AI Lab, Machine Learning Center Shenzhen, China

- Research Areas: Federated Learning, Distributed Learning, Multi-Task Learning, Graph Neural Networks
- Advisor: [Tong Zhang](#), [Junzhou Huang](#), [Peilin Zhao](#)

Tencent (www.tencent.com) November 2014 - July 2018
Tencent Cloud, Social Network Group; Tencent Maps, Mobile Internet Group Shenzhen, China

- Principal Software Engineer (T3.3, equivalent to T7 at Google); Engineering Team Manager (L1-2)
- Areas: Distributed System, Cloud/Mobile Computing, Applied Deep Learning, Machine Learning System
- Mentor: [Julian Ma](#) (VP@Tencent, now CEO@[Inceptio](#) Autonomous driving, CEO@[G7](#)), [Jianjia Xie](#) (GM@Cloud and Smart Industries Group, Tencent), [Menglin Chen](#) (Director@Cloud and Smart Industries Group, Tencent)

Baidu (www.baidu.com) July 2012 - November 2014
Baidu Maps and Location-Based Service Beijing, China

- Senior Software Engineer (T5)
- Research areas: Operating System, Cloud Computing, Distributed System, Computer Graphics
- Application Domains: Maps, Navigation, Taxi-Calling, Internet of Vehicles
- Mentor: [Weihao Gu](#) (General Manager of [Baidu Apollo](#) Autonomous Driving), [Fei Qi](#) (Co-Founder@[Lv Wan](#))

Huawei (www.huawei.com) June 2011 - June 2012
Huawei Consumer Business Group Shenzhen, China

- Software Engineer (Java) for Huawei Smartphone OS; Software Engineer (C++) for Telecommunication Networks

PUBLICATIONS (2020-PRESENT, SELECTED)

- <https://scholar.google.com/citations?user=2z2camUAAAAJ&hl=en> (citations: 2400+; h-index: 13+)
- **SSFL: Tackling Label Deficiency in Federated Learning via Personalized Self-Supervision**
Chaoyang He, Zhengyu Yang, Erum Mushtaq, Sunwoo Lee, Mahdi Soltanolkotabi, Salman Avestimehr
Accepted to **AAAI 2022** - FL Workshop (**Best Paper Award**)
- **LightSecAgg: a Lightweight and Versatile Design for Secure Aggregation in Federated Learning**
Jinhyun So*, Chaoyang He*, Chien-Sheng Yang*, Songze Li, Yu Qian, Salman Avestimehr
(* means co-1st authors)
Accepted to **MLSys 2022** – Fifth Conference on Machine Learning and Systems
- **PipeTransformer: Automated Elastic Pipelining for Distributed Training of Transformers**
Chaoyang He, Shen Li (Facebook AI), Mahdi Soltanolkotabi, Salman Avestimehr
Accepted to **ICML 2021**
- **Group Knowledge Transfer: Federated Training of Large CNNs on the Edge**
Chaoyang He, Murali Annavaram, Salman Avestimehr
Accepted to **NeurIPS 2020**
- **FedML: A Research Library and Benchmark for Federated Machine Learning**
Chaoyang He, Songze Li, Jinhyun So, Mi Zhang, Hongyi Wang, Xiaoyang Wang, Praneeth Vepakomma, Abhishek Singh, Hang Qiu, Li Shen, Peilin Zhao, Yan Kang, Yang Liu, Ramesh Raskar, Qiang Yang, Murali Annavaram, Salman Avestimehr
Accepted to **NeurIPS 2020** SpicyFL workshop (**Best Paper Award**)
- **MiLeNAS: Efficient Differential Neural Architecture Search with Mixed-Level Optimization**
Chaoyang He, Haishan Ye, Li Shen, Tong Zhang
Accepted to **CVPR 2020**

PATENTS

I have 10+ patents in various Internet products (cloud computing, machine learning, mobile computing, etc.).
Check my website for details: <https://chaoyanghe.com/patent/>

AWARDS

Amazon Ph.D. Fellowship for 2021-2022
Qualcomm Innovation Fellowship (QIF) for 2021-2022
FedML.ai won Best Paper Award at SpicyFL@NeurIPS 2020
Tencent Outstanding Staff Award (selection ratio is less than 1%, led to a promotion as Team Manager), 2015-2016
WeChat MyCar, Special Award for Innovation, Mercedes-Benz, Daimler Supplier Award 2016 (teamwork; I worked as the technical leader)
Baidu LBS Group Star Awards (6 holders among 1000+ employees), 2013 Q3Q4
Huawei Golden Network Award in 2012

TALKS

A full list can be found at: <https://chaoyanghe.com/talks/>