

CHAOYANG HE

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RESEARCH AREAS: MACHINE LEARNING × SYSTEM × BLOCKCHAIN

Industrial grade machine learning algorithms and systems at scale, which lies at the intersection of machine learning, distributed systems, edge/cloud/sky computing, blockchain, and security/privacy. My recent focus is:

1. **FedML**: federated learning algorithms, systems, and applications in CV, NLP, Data Mining (GNN), and IoT.
2. **DistML**: distributed training for massive-scale DNNs (e.g., Transformers, MoE, Pathways)
3. Blockchain: zero-knowledge proof; Blockchain L1 and L2 infrastructure
4. Product design for AI, SaaS, MLOps, and Blockchain/Web3; [open-source libraries](#); [Internet products](#)

EDUCATION

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

- Advisor: [Salman Avestimehr](#); Co-Advisor: [Mahdi Soltanolkotabi](#), [Murali Annavaram](#), [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 17; Citations 3800+; Professional Reviews 100+; Invited Talks 5+; Community Users 2k+; GitHub Stars 2.3k; fundraising \$2M
- [PhD Defense](#) (March, 2022); [Hooding Ceremony](#) (May, 2022); [PhD Degree Conferred](#) (August, 2022)

WORKING EXPERIENCE / EMPLOYMENT

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

Google, Facebook, Amazon 2019 - 2022
Part-time Researcher California, USA

- Research on federated learning and distributed training for foundation models (BERT, Vision Transformer, MoE)

University of Southern California 2018 - 2022
Research Assistant, Teaching Assistant California, USA

Tencent (www.tencent.com, ai.tencent.com) November 2014 - February 2019
Tencent AI Lab, Tencent Cloud, Social Network Group; Tencent Maps, Mobile Internet Group

Engineering Manager (L1-2), Principal Software Engineer (T3.3, equivalent to T7 at Google)

- Areas: Cloud/Mobile Computing, Machine Learning, Distributed System, MLOps platform
- Mentor: Menglin Chen (Director@Cloud and Smart Industries Group, Tencent), Jianjia Xie (GM@Cloud and Smart Industries Group, Tencent), [Julian Ma](#) (VP@Tencent, now CEO@[Inceptio](#) Autonomous driving, CEO@[G7](#))
- Research Advisor: [Tong Zhang](#) (director at Tencent AI Lab), [Junzhou Huang](#) (director at Tencent AI ML Center)

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

- Senior Software Engineer (T5); Products: Maps, Navigation, Taxi-Calling, Internet of Vehicles
- Mentor: [Weihaio Gu](#) (CEO@ [Haomo](#)), [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: 3800+; h-index: 17+)
- **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/>