

CHAOYANG HE

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RESEARCH AREAS: MACHINE LEARNING × SYSTEM

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. **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.
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

Ph.D. in Computer Science, Viterbi School of Engineering

August 2018 - August 2022

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 20; Citations 4800+; Professional Reviews 100+; Invited Talks 5+; Community Users 3k+; GitHub Stars 2.6k; fundraising \$6M
- [PhD Defense](#) (March, 2022); [Hooding Ceremony](#) (May, 2022); [PhD Degree Conferred](#) (August, 2022)

WORKING EXPERIENCE / EMPLOYMENT

FedML Inc. (<https://FedML.ai>)

Co-founder, Board Director, CTO

Feb 2022 - Present

California, USA

- Building generative AI MLOps and LLMOps, to make foundation AI easy, efficient, and secure.

Google, Facebook, Amazon

Part-time Research Scientist

2019 - 2022

California, USA

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

Tencent (www.tencent.com, ai.tencent.com)

Tencent AI Lab, Tencent Cloud, Social Network Group; Tencent Maps, Mobile Internet Group

November 2014 - February 2019

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)

Baidu Maps and Location-Based Service

July 2012 - November 2014

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)

Huawei Consumer Business Group

June 2011 - June 2012

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: 5000+; h-index: 21+)
- **PipeTransformer: Automated Elastic Pipelining for Distributed Training of Large-scale Models**
Chaoyang He, Shen Li (Facebook AI), Mahdi Soltanolkotabi, Salman Avestimehr
Accepted to **ICML 2021**
- **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
- **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**)
- **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**)
- **Group Knowledge Transfer: Federated Training of Large CNNs on the Edge**
Chaoyang He, Murali Annavaram, Salman Avestimehr
Accepted to **NeurIPS 2020**
- **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/>