Di Chai

Ph.D. Student of HKUST

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Education

Ph.D. Hong Kong University of Science and Technology   **Hong Kong, China** 2019.9-Now
      Major: Computer Science and Engineering
      Advisors: Prof. Kai Chen and Prof. Qiang Yang

M.Sc. Hong Kong University of Science and Technology   **Hong Kong, China** 2017.9-2018.9
      Major: Big Data Technology

B.Sc. University of Science and Technology Beijing   **Beijing, China** 2013.9-2017.8
      Major: Intelligent Science and Technology

Working Experience

Research Assistant Clustar & HKUST   **Hong Kong, China** 2018.9-2019.8

Profile

Di Chai is a Ph.D. student at the Hong Kong University of Science and Technology, and his advisors are Prof. Kai Chen and Prof. Qiang Yang. His research interests are intelligent, secure, and high-performance distributed computation systems. During his master's and Ph.D. period, he has published 6 international conference/journal papers as the first author, including 2 papers with over 300 citations. During his master's period, he focused on the spatio-temporal traffic prediction system in urban computing, combining graph neural networks with spatio-temporal traffic prediction. The work was published in the top GIS conference SIGSPATIAL'18 and had the highest citation count among all papers in that conference that year (Google Scholar 300+ citations). During his Ph.D. period, he focused on large-scale distributed matrix factorization systems. Matrix factorization is the underlying technology for various real-world applications. His work was among the first to analyze the privacy leakage problem in federated matrix factorization and proposed a secure matrix factorization solution (published in IEEE Intelligent System, Google Scholar 300+ citations). Subsequent work includes a federated singular value decomposition system over billion-scale data (published in KDD'22), which cooperated with BGI Genomics, serving privacy-preserving whole-genome association analysis between multiple institutions, and providing guidance for disease monitoring and clinical diagnosis. Subsequent work also includes the decentralized efficient federated singular value decomposition (accepted by ATC'24), providing a high-performance federated matrix factorization system without relying on any external servers for highly sensitive applications such as genetic data analysis and banking applications.

Conference Paper

C1. Efficient Decentralized Federated Singular Vector Decomposition.
    Di Chai, Junxue Zhang, Liu Yang, Yilun Jin, Leye Wang, Kai Chen, and Qiang Yang.
    USENIX ATC'24 Accepted.

C2. Practical Lossless Federated Singular Vector Decomposition Over Billion-Scale Data.
    Di Chai, Leye Wang, Junxue Zhang, Liu Yang, Shuowei Cai, Kai Chen, and Qiang Yang.
    ACM SIGKDD'22.

C3. Bike Flow Prediction with Multi-Graph Convolutional Networks.
    Di Chai, Leye Wang, and Qiang Yang.

SIGSPATIAL/GIS'18. [Google Scholar 300+ Citations]

C4. Sphinx: Enabling Privacy-preserving Online Learning over the Cloud.

Han Tian, Chaoliang Zeng, Zhenghang Ren, Di Chai, Junxue Zhang, Kai Chen, and Qiang Yang.

IEEE S&P'22.

Journal Paper

J1. A Survey for Federated Learning Evaluations: Goals and Measures.

Di Chai*, Leye Wang*, Liu Yang, Junxue Zhang, Kai Chen, and Qiang Yang. (*Co-first Authors)

IEEE TKDE Accepted (2024).

J2. Secure Federated Matrix Factorization.

Di Chai, Leye Wang, Kai Chen, and Qiang Yang.

IEEE Intelligent Systems, 36(5): 11-20 (2021). [Google Scholar 300+ Citations]

J3. Efficient Federated Matrix Factorization against Inference Attacks.

Di Chai, Leye Wang, Kai Chen, and Qiang Yang.

ACM TIST, 2022, 13(4): 1-20.

J4. Exploring the Generalizability of Spatio-Temporal Traffic Prediction: Meta-Modeling and an Analytic Framework.

Leye Wang, Di Chai, Xuanzhe Liu, Liyue Chen, and Kai Chen.

IEEE TKDE, 2021, 35(4): 3870-3884.

Workshop Paper

W1. Aegis: A Trusted, Automatic and Accurate Verification Framework for Vertical Federated Learning.

Cengguang Zhang, Junxue Zhang, Di Chai, and Kai Chen.

IJCAI FL-Workshop (2021). [Best Application Award]

W2. Practical and Secure Federated Recommendation with Personalized Mask.

Liu Yang, Junxue Zhang, Di Chai, Leye Wang, Kun Guo, Kai Chen, and Qiang Yang.

International Workshop on Trustworthy Federated Learning (2022).

W3. Secure Forward Aggregation for Vertical Federated Neural Networks.

Shuowei Cai, Di Chai, Liu Yang, Junxue Zhang, Yilun Jin, Leye Wang, Kun Guo, and Kai Chen.

International Workshop on Trustworthy Federated Learning (2022).

Honors and Awards

2022   Best Application Awares @ International Workshop on Trustworthy Federated Learning

2017   SODA Seed Award (with ten thousand yuan bonus)

2016   Meritorious Winners, Mathematical Contest In Modeling (Top 8%)

Journal Reviews

I have been a reviewer for the following journals:

- IEEE Transactions on Mobile Computing.

- IEEE Transactions on Services Computing.

- IEEE Transactions on Information Forensics and Security