Chenyang Zhang

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Brief Introduction

I am a Ph.D candidate majoring in Software Engineering at the School of Data Science and Engineering, East Normal University. My research interests are runtime optimizations for Database systems and Machine Learning systems. I am currently working on Data Centric Optimizations for Machine Learning Systems, which aims at optimizing modern AI applications using both systems.

Education

- **East China Normal University** *September 2022 - Current*
  Ph.D. candidate in Software Engineering, Data Management and Intelligence Computing (DMIC) System Group Shanghai, China
  - GPA: 3.52/4.00.
  - Currently researching on Data Centric Optimizations for Machine Learning Systems, advised by Prof. Chen Xu.
- **Donghua University** *September 2018 - June 2022*
  Bachelor of Software Engineering Shanghai, China
  - GPA: 4.13/5.00.
  - Thesis: "Real-time Fish Tracking Algorithm based on Deep Learning" (Outstanding Thesis Award).

Experience

- **Transwarp [🌐]** *October 2021 - June 2022*
  Database Development Intern Shanghai, China
  - Participated in the development of TimeLyre, a time series database based on a fork of InfluxDB.
  - Developed a benchmark tool for time series data ingestion with data generation and metric measurement.
  - Conducted analysis on user defined functions in InfluxDB, designed an interface for UDF authorization.
  - Implemented an optimization on the storage engine, improved the compression ratio for time series data.

Projects

- **IMBridge: [Impedance Mismatch Mitigation for Prediction Query Execution]** *December 2023 - April 2024*
  Project Leader, collaborated with OceanBase, Ant Group, received by SIGMOD 2025 Research Track [🐙]
  - Proposed a runtime *inference context reuse cache* to achieve automatic one-off inference context setup.
  - Introduced *batch-aware function invocation* enabling desirable batching inference on prediction functions.
  - Implemented IMBridge prototype system on top of OceanBase and DuckDB.
  - Conducted thorough experimental studies to demonstrate the optimizations of IMBridge.
- **RECS: [Scheduling Data Processing Pipelines for Incremental Recommendation Training]** *June 2023 - February 2025*
  Core Project Member, collaborated with Tencent Inc., received by SIGMOD 2025 Industrial Track
  - Proposed an *intra-pipeline scheduling strategy*, which dynamically prefetches feature processing operators.
  - Proposed an *inter-pipeline scheduling strategy*, which prioritizes the execution of critical pipelines.
  - Implemented RECS prototype system on top of TensorFlow.
  - Conducted thorough evaluations to showcase the optimizations of RECS on industrial workloads.
- **Craftsman: [Machine Learning Inference Using Pure SQL Optimized with Operator Fusion]** *July 2024 - March 2025*
  Project Member, collaborated with PingCAP, received by ICDE 2025 Research Track
  - Introduced *template-based rule design*, which enables fusion optimizations for ML operators.
  - Proposed *cost-based graph selection* to generate efficient SQLs for executing ML inference in database.
  - Developed Craftsman prototype as a standalone Python module for ML2SQL.
  - Conducted experimental studies to demonstrate the effectiveness of Craftsman.
- **IMLane: [Impedance Mismatch Mitigation for Parallel Prediction Query Execution]** *May 2024 - Current*
  Project Leader, collaborated with OceanBase, Ant Group, under development
  - Proposed to leverage a *process level parallel invocation* architecture to achieve the true parallel prediction.
  - Introduced a *decoupled task scheduling* strategy to guarantee a balanced task scheduling.
  - Implemented IMLane prototype system as a database plugin and integrated it into DuckDB.
  - Conducted experimental studies to showcase the effectiveness of IMLane.

- **SliceFlow: [Eliminating Redundant Computation for Recommendation Model Inference]** *September 2024 - Current*
  Project Leader, under development
  - Proposed to define the *redundancy data representation* in recommendation inference workloads.
  - Introduced rules of *operator substitutions and computation graph rewrite* for redundancy elimination.
  - Plan to develop the SliceFolw prototype system on top of Torch.fx and ONNX.
  - Plan to Conduct experimental studies to showcase the effectiveness of SliceFlow.

Publications and Patents

C=Conference, J=Journal, P=Patent, S=In Submission, T=Thesis

[C.1] **Chenyang Zhang**, Junxiong Peng, Chen Xu*, Quanqing Xu, and Chuanhui Yang. (2024). IMBridge: Impedance Mismatch Mitigation between Database Engine and Prediction Query Execution. In Companion of the 2024 International Conference on Management of Data (SIGMOD).

[C.2] **Chenyang Zhang**, Junxiong Peng, Chen Xu*, Quanqing Xu, and Chuanhui Yang. (2025). Mitigating the Impedance Mismatch between Prediction Query Execution and Database Engine. In Proc. ACM Manag. Data (PACMMOD).

[C.3] Zihao Chen, **Chenyang Zhang**, Chen Xu*, Zhao Zhang, Jiaqiang Wang, Weining Qian, and Aoying Zhou. (2025). Scheduling Data Processing Pipelines for Incremental Training on MLP-based Recommendation Models. In Companion of the 2025 International Conference on Management of Data (SIGMOD).

[C.4] Qingfeng Pan, Jiahe Zhi, **Chenyang Zhang**, Chen Xu*, Zhao Zhang, Anita Shao, Guanglei Bao, Qiu Cui, Xiaowei Chen, and Aoying Zhou. (2025). Machine Learning Inference Pipeline Execution Using Pure SQL Based on Operator Fusion. In 41th IEEE International Conference on Data Engineering (ICDE).

Honors and Awards

- **SIGMOD 2024 Student Support Scholarships** *June 2024*
  SIGMOD/PODS 2024 Organizing Committee
- **Outstanding Graduate of Shanghai** *July 2022*
  Shanghai Municipal Commission of Education
- **Outstanding Undergraduate Thesis** *June 2022*
  Donghua University
- **The First Prize of AI application Track** *August 2021*
  China Undergraduate Computer Design Competition
- **Donghua University Student Scholarship** *November 2020*
  Donghua University Education Foundation
- **Outstanding Student** *November 2020*
  Donghua University

Volunteer Experience

- **Teaching Assistant** *September 2024 - December 2024*
  Graduate Course: Distributed Computation Systems
  - Participated in the discussion and evaluation of student projects.
  - Learned some new ideas about data processing systems.

References

1. **Chen Xu**
   Professor, School of Data Science and Engineering
   East China Normal University
   Email: cxu@dase.ecnu.edu.cn
   Phone: 021-62231592
   Relationship: Doctoral supervisor