Enhao Zhang

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Education

- **University of Washington** Seattle, WA
  Ph.D in Computer Science *Sept. 2020 – Present*
  - Advisor: Prof. **Magdalena Balazinska** and Prof. **Ranjay Krishna**
- **University of Michigan** Ann Arbor, MI
  Bachelor of Science Engineering in Computer Science *Sept. 2018 – Apr. 2020*
  - Overall GPA: 4.00/4.00
  - Advisors: Prof. **Nikola Banovic** and Prof. **Michael Cafarella**
- **Shanghai Jiao Tong University** Shanghai, China
  Bachelor of Science in Electrical and Computer Engineering *Sept. 2015 – Aug. 2020*
  - Overall GPA: 3.97/4.00 (Ranking: 1^{st}/202)

Publications

- **Self-Enhancing Video Data Management System for Compositional Events with Large Language Models** [Paper]
  Enhao Zhang, Nicole Sullivan, Brandon Haynes, Ranjay Krishna, Magdalena Balazinska. In submission.
- **VOCALExplore: Pay-as-You-Go Video Data Exploration and Model Building** [Paper]
  Maureen Daum, Enhao Zhang, Dong He, Stephen Mussmann, Brandon Haynes, Ranjay Krishna, Magdalena Balazinska. VLDB 2024.
- **EQUI-VOCAL: Synthesizing Queries for Compositional Video Events from Limited User Interactions** [Paper] [Technical report]
  Enhao Zhang, Maureen Daum, Dong He, Brandon Haynes, Ranjay Krishna, Magdalena Balazinska. VLDB 2023.
- **EQUI-VOCAL Demonstration: Synthesizing Video Queries from User Interactions** [Paper]
  Enhao Zhang, Maureen Daum, Dong He, Manasi Ganti, Brandon Haynes, Ranjay Krishna, Magdalena Balazinska. VLDB 2023 Demo Track.
- **VOCAL: Video Organization and Interactive Compositional AnaLytics** [Paper]
  Maureen Daum*, Enhao Zhang*, Dong He, Magdalena Balazinska, Brandon Haynes, Ranjay Krishna, Apryle Craig, Aaron Wirsing. CIDR 2022. (* indicates equal contributions)
- **Method for Exploring Generative Adversarial Networks (GANs) via Automatically Generated Image Galleries** [Paper]
  Enhao Zhang, Nikola Banovic. CHI 2021.

Honors and Awards

- **Madrona Prize** (Recognizing the most commercializable research project) (☞ Link), Paul G. Allen School of Computer Science & Engineering, UW, 2022
- **Cheng Family Scholarship**, Joint Institute, Shanghai Jiao Tong University, 2018
- **Interdisciplinary Contest in Modeling**, Honorable Mention, 2017
- **Distinguished Academic Achievement Award** (Academic performance in the top 2% of class), Joint Institute, Shanghai Jiao Tong University, 2016
- **Undergraduate National Scholarship** (Top 7 students in Joint Institute), Ministry of Education of People's Republic of China, 2016

Research Experience

- **VOCAL** Seattle, WA
  Advised by Prof. Magdalena Balazinska and Prof. Ranjay Krishna *Sept. 2020 – Present*
  - Propose an interactive video analytics system to support efficient data cleaning, exploration and organization, and compositional queries, even when no pretrained model exists to extract semantic content.
- **Video Analytics with LLMs** Seattle, WA
  Advised by Prof. Magdalena Balazinska and Prof. Ranjay Krishna *Sept. 2023 – Present*
  - Propose a new system that can answer user's compositional queries over videos, even when the atomic modules necessary to answer the queries are unavailable. The user only needs to specify the intended query in natural language description, then we use large language models (LLMs) to determine what modules are needed, generate new modules, and use them to answer the query.
- **EQUI-VOCAL** Seattle, WA
  Advised by Prof. Magdalena Balazinska and Prof. Ranjay Krishna *Sept. 2020 – Dec. 2022*
  - Designed EQUI-VOCAL, a new system that automatically synthesizes queries over videos from limited user interactions and enables users to find complex events without database expertise, with limited labeling effort, and without declarative specifications or sketches.
  - Introduced an expressive data model and a query language based on spatio-temporal scene graphs, proposed a new approach that efficiently synthesizes the user's intended examples from examples, and implemented a set of optimizations to reduce computational effort.
  - Demonstrated that EQUI-VOCAL outperforms two baselines–in terms of F1 score, synthesis time, and robustness to data noise–and can flexibly synthesize complex queries that the baselines do not support.
- **VOCALExplore** Seattle, WA
  Advised by Prof. Magdalena Balazinska and Prof. Ranjay Krishna *Sept. 2020 – Mar. 2023*
  - Built VOCALExplore, an interactive system that supports users in building domain-specific models over videos. VOCALExplore avoids expensive preprocessing, maximizes model quality by dynamically selecting the best data sampling strategy and feature extractor for each dataset, ensures low user-visible latency without sacrificing model performance.
- **GAN Explorer** Ann Arbor, MI
  Advised by Prof. Nikola Banovic *Sept. 2019 – Sept. 2020*
  - Designed an interactive tool for Generative Adversarial Network (GAN) exploration and evaluation, where users can assess capabilities and limitations of a GAN via interactive visual examination.
  - Used a Markov Chain Monte Carlo (MCMC) method for automated image gallery generation, which enabled quick creation of many diverse, photo-realistic image galleries to support qualitative evaluation of GANs.

- **Video Database Analytics System** Ann Arbor, MI
  Advised by Prof. Michael Cafarella *May. 2019 – Jan. 2020*
  - Researched and optimized a video database system supporting binary content-based queries, by constructing CNN classifier cascades in replace of the complex user-supplied classifier and constructing a multi-resolution video dataset from the original dataset.
  - Tested the database system on a dashcam dataset and achieved 5x speedup with 5% accuracy tradeoff.
  - Implemented a graphical user interface with Streamlit for the system.
- **Economic Product Price Prediction** Ann Arbor, MI
  Advised by Prof. Michael Cafarella *May. 2019 – Jan. 2020*
  - Predicted prices of economic products, from highly imbalanced dataset, based on product descriptions that were not human interpretable and category names.
  - Preprocessed and cleaned data with inconsistent quality; explored different bin ranges for each category.
  - Built and fine-tuned a price predictor using LSTM for each category, with 82 categories in total.
- **Study of Personalized Active Learning** Ann Arbor, MI
  Advised by Prof. Nikola Banovic *Jan. 2019 – Nov. 2019*
  - Investigated user-computer interaction in machine learning algorithms, where user provides training labels to machine-end and machine learning method realizes user personalization.
  - Designed and developed a query-based image retrieval system using active learning strategies with various functionalities, including extracting photos from user's social media account, querying images and updating alternate texts.

Work Experience

- **Microsoft Research** Redmond, WA
  Incoming research intern *Jun. 2024 - Sept. 2024*

- **Snowflake** San Mateo, CA
  PhD software engineer intern, SQL Query Language Team *Jun. 2023 - Sept. 2023*
  - Developed end-to-end solutions of null handling improvements for SQL functions and operators.

Mentoring Experience

- **Current undergrad student:** Manasi Ganti
- **Past undergrad students:** Brian Yao, Chongjiu Gao, Lyons (Daoyi) Lu, Yichi Zhang
- **Past high school students:** Anish Chaudhuri, Parie Kumar

Professional Service

- **Reviewer** – CHI 2022, CSCW 2022
- **Session host** – CS Education Week

Tutoring Experience

- **TA, CSE 444: Database Systems Internals**, University of Washington *Winter 2023*
- **Grader, EECS 370: Intro. to Computer Organization**, University of Michigan *Winter 2019*
- **TA, VY200: Academic Writing II**, Shanghai Jiao Tong University *Spring 2017*
- **TA, VY100: Academic Writing I**, Shanghai Jiao Tong University *Fall 2016*