Zichen Zhang (Charlie Zhang)

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Research Interest

I'm passionate about training unified foundation models that accept multimodal inputs, including **touch**, **images**, **videos**, **language**, and **audio**. I'm enthusiastic about building efficient multimodal models by **efficiently fine-tuning** pre-trained unimodal models using a limited amount of downstream data and improving unimodal accuracy by **transferring representations** learned from other modalities.

Education

- **University of Michigan** *April 2022 - Present*
  B.S., Computer Science Ann Arbor, MI, USA
  - **Relevant Course Topics**: Computer Vision, LLMs, Robot Learning for Planning and Control, ML Research, ML, Distributed Systems, Operating Systems, Web Systems, Data Structures and Algorithms, Computer Organization, Logic Design, Linear Algebra, Calculus, Probability
  - **Organizations & Activities**: LSA Honors, Michigan Hackers, MHacks hackathon, V1, Power Hour, Undergraduate Research Opportunity Program (UROP)

Publications

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

[S.1] **Zichen Zhang**, Minji Kim. (2024). **MIA-Sort: Multiplex Chromatin Interaction Analysis by Efficiently Sorting Chromatin Complexes**.

Research Projects

- **Babysitting a Small Language Model through One-Step Tree-of-Thoughts Knowledge Distillation** *December 2024*
  Keywords: SmolLM, semi-supervised learning, causal language modeling, Chain-of-Thought (CoT), Tree-of-Thoughts (ToT) [GitHub]
  - Replicated CoT and ToT performances using GPT-4o on the Game of 24, achieving higher success rates than the GPT-4 in Yao et al. 2023
  - Proposed One-Step ToT, a simplified prompting framework that integrates ToT reasoning into a single structured prompt, and proved its effectiveness over naive CoT
  - Demonstrated that after distilling ToT-style knowledge into an SLM like SmolLM-360M, the SLM can achieve significant improvements on the Game of 24 and rival LLMs like GPT-4o
- **VTMo: Unified Visuo-Tactile Transformer Encoder with Mixture-of-Modality-Experts** *October 2024*
  Keywords: multi-modality, transfer learning, InfoNCE loss, image-to-tactile retrieval [GitHub]
  - Proposed the VTMo, a unified and modular vision-touch transformer encoder
  - Demonstrated that the proposed method can be trained more efficiently and achieve higher accuracy on the Image-to-Tactile retrieval task, beating the baseline CLIP-style dual encoder

Other Projects

- **GenHint (🏆 MHacks 2024 Best Developer Tool Winner)** *September 2024*
  Tools: Groq's AI Inference API, Llama-3-70B, Node.js, VS Code API, TypeScript, Warp Terminal [GitHub]
  - Designed and developed an education-focused AI coding assistant integrating VS Code APIs, enabling real-time step-by-step guidance powered by Groq's fast inference engine
  - Processed user comments into actionable "TODO" steps, in contrast to traditional AI tools like GitHub Copilot
  - Created a VS Code extension deployed in the Visual Studio marketplace
- **Collage: An AI-Driven Education Technology Platform** *August 2024*
  Tools: LlamaIndex, Scikit-learn, Natural Language Toolkit, OpenAI API, MySQL, React.js, Flask [Web]
  - Developed an AI-driven platform to personalize class schedules and career exploration, enhancing user engagement and academic planning
  - Applied AI Agents and Retrieval-Augmented Generation (RAG) pipelines for personalized course recommendations, enabling features like AI academic advisor and course recommendations
  - Designed a user-friendly interface for students to explore career paths and make informed educational decisions
  - Streamlined CI/CD deployment using Heroku, ensuring continuous integration

Research Experience

- **U-M Minji Lab [🌐]** *May 2024 - Present*
  Research Intern Ann Arbor, MI, USA
  - Developed MIA-Sort, an efficient sorting algorithm that reads a dataset of 4 billion chromosome genome-scale metabolic models (GEMs) fragments and ranks them in different schemes
- **U-M Direct Brain Interface Laboratory [🌐]** *September 2022 - April 2023*
  Research Intern Ann Arbor, MI, USA
  - Deployed the branch logics of the brain-computer interface survey instrument in Qualtrics
  - Implemented the automated user interaction functionalities in JavaScript and JavaScript APIs

Industry Experience

- **Collage [in]** *March 2024 - Present*
  Co-Founder & CTO Remote
  - Led a cross-functional startup engineering team using Agile Scrum methodology to develop an AI-driven platform with React and Flask, improving user engagement and academic planning
  - Collaborated with the university administration, stakeholders and clients to gather technical requirements and ensure alignment of platform features with educational needs

Challenge Prizes

- **Honorable Mention Best Developer Tool** *September 2024*
  MHacks, Major League Hacking [🌐]
  - One of the largest hackathons, attracting over 550 students from leading universities in North America

Honors

- **University Honors** *December 2022, April 2023, December 2023, May 2024*
  University of Michigan [🌐]
  - Awarded to students who earned a 3.5 GPA or higher during a term
- **James B. Angell Scholar** *March 2024*
  University of Michigan [🌐]
  - Awarded to students who achieve an "A" record for two or more consecutive terms
- **William J. Branstrom Freshman Prize** *March 2023*
  University of Michigan [🌐]
  - Award to first-term freshmen who rank in the upper 5%
- **Yale Young Global Scholars (YYGS)** *July 2021*
  Yale University [🌐]
  - A competitive program for outstanding high school students from around the world focusing on discussing and tackling global challenges