Hao Xu

Curriculum Vitae

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Education

Hong kong University of Science and Technology-Guangzhou | Sep 2024 – Jun 2027 |
Master of Philosophy, first-year MPhil in AI

The School of Computing, Sun Yat-sen University | Sep 2020 – Jun 2024 |
Bachelor of Computer Engineering, B.E

- GPA: **3.6/4.0**, IELTS: **7.5/9.0** (Listening 8, Speaking 7, Reading 8, Writing 6.5)
- Core Courses: Computer Programming I (**Honor, 100**), Computer Programming II (95), Discrete Mathematics(96), Artificial Intelligence Practice(91), Software Engineering(94), Computer Networking Lab (94), and Database Systems Lab (90)
- Awards:
  - **National Inspirational Scholarship**
  - Academic Merit-based Scholarship

The School of Computing, National University of Singapore | May 2023 – Aug 2023 | Singapore
Summer School
Course Name: Visual Computing
Course Project: Traffic Sign Recognition (**A Prize**)

Research Projects

Infinite Mobility: Scalable High-Fidelity Synthesis of Articulated Objects V2 (Ongoing) | April 2025 – present | Intern in OpenRobotLab of Shanghai Ai Lab

- Proposed a procedural generation pipeline for large-scale, high-fidelity articulated 3D object synthesis.
- Designed articulation structures as URDF-style trees, enabling controllable and diverse object motions.
- Developed hybrid geometry pipeline combining procedural mesh generation with dataset-based retrieval and refinement.
- Implemented physics-aware joint configuration, material realism, and collision-safe modeling for simulation compatibility.
- Enabled training of generative models (e.g., CAGE) on synthetic data, supporting scalable generation and embodied AI tasks.
- Deployed generated assets in simulators like Isaac Sim and Sapien for downstream robotic manipulation experiments.

Visual Question Answering based on Visual Programming | Oct 2023 – May 2024 | Personal Thesis | Individual | **Best Bachelor Thesis(Top 5%)**

- Aim to develop a Visual Question Answering system based on the framework from 2023 best paper of CVPR "Visual Programming: Compositional Visual Reasoning without Training"
- Two Aims: Increase Interpretability, pursuit for more generalized multimodal framework.
- Explored various multimodal architectures including ViLT(Vision-Language-Transformer), CLIP(Contrastive Language-Image Pretraining), and BLIP(Bootstrapping Language-Image Pre-training) for processing both image and text inputs effectively.
- Deconstruct the VQA into two steps: Generate High-Level Programs by offering Large Language Models the preset prompts, break the task into step-by-step subtask. Then correspondingly use different modules for each subtask.
- Conducted comparison experiments on different VQA modules and analyzed their strength and weakness.

Traffic Sign Recognition | July 2023 | Traffic Sign Recognition | Team (Team Leader)

- Aimed to develop AI models for recognizing traffic signs on the GTSRB dataset, which consists of 43 classes and 39,209 images, with main challenges of (a) Occlusion (b) High Similarity (c) Blurriness (d) Underexposure (e) Glare Effect (f) Interference and etc.

- Traditional CV: Explored different combinations of traditional feature extraction methods(HOG, LBP, FFT and etc) and classifiers(SVC, Random Forest, KNN , Decision Tree, MLP).
- Neural networks: Designed and trained a 11 layers network(My-Net11), which achieves 97.36% accuracy.
- Integrated our model with 5 others like AlexNet, VGGNet, and etc. Eventually achieved a remarkable 99.58% accuracy by Voting.

Chinese-to-English Machine Translation | June 2023 | Neural Machine Translation | Individual

- Aimed to design a neural machine translation model that translates Chinese to English on a dataset sampled from WMT Competition(10,000 sentences).
- Employed sequence-to-sequence (seq2seq) framework, whose encoder and decoder are both 3-layer bidirectional LSTM.
- Implemented the beam search algorithm, which considers multiple possibilities when generating translation candidates.

Course Projects

Face Classification | May 2023 | Linear Classification | Individual

- Aimed to train a face recognition model to classify 500 people's face photos into their unique IDs on a dataset which has more than 10,000 224x224 pictures. (Restriction: Self designed & trained models.)
- Picked Cross Entropy as the loss function, adopted tricks like Batch Normalization, Data augmentation, different initialization methods and more to improve performance.
- Depending on different devices, I constructed different networks from 3 layers CNN on my own desktop, to 11 layers Resnet on a remote server, respectively achieving 49.6% and 81.0% accuracies. (Pretrained Resnet 18's accuracy is around 73%).

SYsU-lang | April 2023 | Compiler Component for SYsU Language | Individual

- SYsU is an instructional language used in the teaching of the Compiler Principles course at Sun Yat-sen University. Using LLVM, I developed components such as a lexer, parser, and IR generator for the SYsU language, eventually compiling SYsU into LLVM IR.

Lab Experience

OpenRobotLab in Shanghai AI Lab | April 2025 – present

- Focused on **Embodied Intelligence**, including subfields of **Embodied Big Data**, **Embodied Simulation Platform**, **Embodied Multimodal Large Model**, and **Embodied Control**.

Human Cyber Physical Intelligence Integration Lab | Sep 2023 – June 2024

- Focused on fields like **Computer Vision**, **Natural Language Processing**, **Machine Learning**, **Embodied AI**, and etc.

Tianhe-2 National Supercomputing Center | Oct 2021 – June 2023

- Focused on fields like **Supercomputer Architecture**, **Parallel Computing**, **Artificial Intelligence and Machine Learning**, and etc.

Skills and Abilities

- Programming languages: C/C++, Python, LaTeX, HTML, CSS, Javascript, Matlab, Sql and etc.
- Platforms: Git, Github, Pytorch, Tensorflow, Keras, Hugging face and etc.
- Tools: Visual Studio Code, Blender, Docker, Anaconda, Jupyter Notebook, Colaboratory, and etc.

Misc.

- I'm a loyal reader, with a vast interest from literature to philosophy, psychology, and cultural books. I have 40+ extracurricular books in my dormitory and over hundreds in my own home. Here I list several of my favorite:

- Orwell, G. (1949). *1984*. Harcourt Brace & Company;
- Harari, Y. N. (2014). *Sapiens: A Brief History of Humankind*. Harper.
- McCullers, C. (1940). *The Heart Is a Lonely Hunter*. Mariner Books
- Rosenbaum, R. R. (1987). Intimate Relationships. W. W. Norton & Company.
- Yu, H. (1993). *To Live*. Nanjing: Nanjing Publishing House ..... (Would be so excited to talk about these!!!)

- I enjoy singing and have participated in school choirs. I even once led a street pop performance. Folk, pop and country music are my favorite.