Kangrui Cen

kr2256671169@sjtu.edu.cn kangruicen@gmail.com
Homepage: Kr-Panghu.github.io https://github.com/Kr-Panghu

Education

- **Zhiyuan College, Shanghai Jiao Tong University** Shanghai, China
  Bachelor of Computer Science *Sept 2021 - Present*
  - Member of John Hopcroft Honors Class, which is an elite CS program for top 5% talented students.
  - **Overall GPA**: 86.39/100, **Major GPA**: 89.47/100.
  - **Selected Courses**:
    - **Computer Science**: Programming and data structure II (A+), Programming and data structure III (A+), Efficient Tools and Effective Operations in Computer Systems (A+), Data Mining (A+), Computer System Design and Implementation (A+), Cryptography in Blockchain (A+), Operating System (A)
    - **Mathematics**: Optimization Methods (A+), Computational Complexity (A+), Information Theory (A), Topics in Modern Algorithms (A)

Paper

- **LayerT2V: Interactive Multi-Object Trajectory Layering for Video Generation** (Under Review of CVPR)
  Kangrui Cen*, Baixuan Zhao, Yi Xin, Siqi Luo, Guangtao Zhai, Xiaohong Liu*

Research Experience

- **Optimization for Parallel Graph Algorithm based on Hierarchical Architecture** Basic-Lab, SJTU
  Undergraduate Research Intern, supervised by Prof. Qiang Yin. *June 2023 - Jan 2024*
  - Performing hierarchical decomposition of a large-scale image followed by precomputation to enhance the overall performance of dynamic graph analysis.
  - Optimizing the graph partitioning algorithm to minimize the frequency of loading subgraphs onto the GPU, thereby achieving GPU acceleration.
  - Theoretical proof of the correctness of the hierarchical graph algorithm for the Single-Source Shortest Path problem.

- **Advanced Deep Learning Approaches for Image Quality Analysis and Enhancement** MultiMedia-Lab, SJTU
  Undergraduate Research Intern, supervised by Prof. Xiaohong Liu. *Feb 2024 - Present*
  - Local quality reduction of high-quality images from AIGI using a diffusion model with masks to construct the corresponding dataset.
  - Regression prediction of the argument of the diffusion model and the degree of localized quality reduction using neural network.
  - Design a CNN-based network that can predict the localized quality scores of AIGI.

- **LayerT2V: Interactive Multi-Object Trajectory Layering for Video Generation** VL Lab, UC Merced
  Exchange Scholar, supervised by Prof. Ming-Hsuan Yang and Dr. Kelvin C.K. Chan *June 2024 - Present*
  - Put forward the *first* methodology that generates videos by layering backgrounds and foreground objects separately.
  - These transparent video layers allow for the flexible compositing of multiple independent elements within a video, with each element positioned on a distinct *layer*, enabling complex visual effects and greater control over the generation process.
  - LayerT2V is the *first* method that is capable of handling complex multi-object colliding motions, and demonstrates its superiority over SOTA, showcasing 1.4× and 4.5× improvements in mIoU and AP50 and significant gains in other metrics.

Course Project

- **Bootstrapping Diffusion Model** Shanghai, China
  CS3964 Image Processing and Computer Vision Course Project *Dec 2023*
  - Leverage synthetic data generated by the model training and train Diffusion/GAN model in a bootstrap manner.
  - Give an affirmative conclusion that generative model can boot-strap itself to deepen its understanding.
  - By recycling samples over successive generations, we continually expand the breadth and variety of our training data.
    GitHub Project Paper
- **Using information theoretic metrics to study the importance of individual neurons** Shanghai, China
  ICE2601 Information Theory Course Project *May 2023*

- Use information theoretic metrics for node pruning to learn the importance of individual neurons at different levels in the whole deep neural network.
- Entropy, Mutual information and KL-Selectivity are used to determine the order of ablation.
- Figure it out that it is reasonable to use mutual information and KL-Selectivity as indicators of node pruning, indicating that they are strongly correlated with the classification results. GitHub Project Paper Slides

- **Stop Running Your Mouth: Machine Unlearning 4 Pre-Trained LLMs** Shanghai, China
  CS3966: Natural Language Processing and Large Language Model *Spring 2024*
  - Employ the Machine Unlearning approach to mitigate the retention of unethical data within LLMs and prevent the generation of harmful responses. We carefully design a method to ensure: (1) For a negative Q&A training pair, the LLM forgets its original response to the input; (2) The LLM randomly maps negative prompts to any output distribution within its output space; (3) The LLM maintains a level of general language ability close to its original state post-unlearning. GitHub Project Paper Simulative Rebuttal Slides

Honors and Awards

- Merit Scholarship, B Level (top 10%), SJTU *2022,2023*
- Zhiyuan Honors Scholarship (top 5%), SJTU *2021,2022,2023*
- Meritorious Winner of MCM/ICM (top 7%) *2022*

Other Experience

- Teaching Assistant *2023 Summer Semester*
  Programming and data structure III
- Proficient with: C/C++/C#, Python (PyTorch, NumPy, etc.), Rust, Linux, LaTeX