Zhongqian Duan

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Education

University of Michigan Ann Arbor, MI
M.S.E. in Computer Science
- Relevant Coursework: Natural Language Processing, Web Systems, Computer Networks, Parallel Computing

University of Michigan Ann Arbor, MI
B.S.E. in Computer Science (GPA: 3.9 / 4.0) May. 2022
- Relevant Coursework: Machine Learning, Computer Vision, Deep Learning, Operating Systems, Database

Shanghai Jiao Tong University Shanghai, China
B.S.E. in Electrical and Computer Engineering (GPA: 3.7 / 4.0) Aug. 2022

Work Experience

University of Michigan Ann Arbor, MI
Graduate Student Instuctor Sep. 2023 – Present
- Led weekly discussion sessions and office hours for EECS 587 Parallel Computing. (**CUDA, OpenMP, MPI**)

Apple Inc. Beijing, China
Machine Learning Engineer intern May. 2023 – Sep. 2023
- Built a **gRPC** server, validator and RemoteDataset for distributed data feeding and validation, which increased the data processing speed by around 10%.
- Constructed a robust pipeline to create real-time physical simulation datasets using **Python**, resulting in a base model that can be efficiently fine-tuned for specific task, reducing the need for extensive data and enhancing performance.

Rec Room Seattle, WA
Software Engineer Intern Jan. 2023 – Apr. 2023
- Developed over 20 chips using **C#** and **Git** version control for Rec Room's CircuitV2 System.
- Created a tool prefab named "Motion Trail," which utilized **Protobuf** for Serialization and **Photon** Unity Networking (PUN) for Synchronization. The purpose of this tool was to enhance the visual appeal of moving objects.

NIO Shanghai, China
Machine Learning Engineer Intern May. 2021 – Aug. 2021
- Improved the 3D object tracking network for autonomous vehicles with **PyTorch**, resulting in a 4% increase in precision.
- Applied pre-trained vision models, such as MaskRCNN, with different backbones to detect vehicles and lane lines, testing on over 2000 on-screen videos for autonomous driving systems.

Research Experience

An Improved Method for Full High Definition Demoiréing HR-Demoire
- Integrated *netEdge* with **SE block** in **Pytorch** to predict the edge of moire-free images, which reinforces the base network in low-resolution and selects high-freq regions for refine network, and increased PSNR by 2.6%.
- Proposed a 3-stage image processing pipeline to utilize a pre-trained low-resolution network to high-resolution: Downsample → Demoiré → Multi-Stage Progressive Detail Restoration, which increased PSNR by 5%.

Project Experience

Text-Image Pair Generation via Pre-trained Vision-Language Models
- Utilized **chatGPT** and Midjourney to generate the first AI Dataset with text-image pairs for Image Caption.
- Finetuned some popular state-of-the-art vision language models, such as *mPLUG* and *OFA* to the generated Dataset, increasing the value of CIDEr from 133.4 to 135.1.

Instagram Website Simulator
- Developed an Instagram clone with client-side dynamic pages using **React**, **Flask** app and **SQLite** database.
- Implemented real Instagram features, including login, post, comment, like, and follow, using **REST API**.

Parallel Computing of Word Search
- Implemented a parallel solution to the Word Search puzzle game using **OpenMP** and backtracking algorithms.
- Improved the speed of the program by sharing the visited array between different states in the BFS algorithm
- Conducted experiments with different hyperparameters, demonstrating the scalability and efficiency of parallel solution.

Skills and Honors

Programming: C/C++, C#, Python, Java, JavaScript, Matlab, HTML, CSS, React.js, Flask, SQL
Tools and Frameworks: Git, Pytorch, LaTeX, CUDA, OpenMP, MPI, OpenCV, Scikit-learn, Unity3D
Honors: James B. Angell Scholar, 4 Term University Honors and Dean's List, Undergraduate Excellent Scholarship of SJTU