Yiyang (Lawrence) Luo

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Education

Nanyang Technological University (NTU) Singapore
M.Sc. in Artificial Intelligence (MSAI) (Cumulative GPA: 4.5/5.0) Jan 2023 - Present
The Chinese University of Hong Kong (CUHK) Hong Kong, China
B.Sc. in Computer Science (GPA: 3.45 / 5.0) Aug 2018 - Jul 2022

Skills

- Programming Languages: C, Python, Java, JavaScript, Rust
- Software Skills: Latex, Git, PyTorch, OpenCV, Docker
- Language Skills: Mandarin (native), English (full professional)

Publication

- **Luo, Y.**, & Lin, K. (2023). PISA: Point-cloud-based Instructed Scene Augmentation. *arXiv preprint* [Cs.CV] *arXiv: arXiv.2311.*16501. (Under review)
- Zhou, J., Leong, C., **Luo, Y**., Lin, M., Liao, W., & Li, C. (2021, October). Unified Feature Fusion Network with Path Router for Multi-task Image Restoration. In *2021 IEEE 21st International Conference on Communication Technology (ICCT)* (pp. 1206-1210). IEEE.

Internship

Huawei Hong Kong Research Center Hong Kong, China
Research Intern May 2023 – Aug 2023

- Undertook comprehensive research on various distributed frameworks, including Dask, Torch, and Mindspore, to assess their parallel distribution system designs.
- Developed and executed tensor native graph algorithms on distributed systems, leveraging parallel computing techniques. This implementation significantly enhanced algorithm performance, achieving a speed comparable to Nvidia's Rapids' Cugraph package, with only a minimal 5% reduction.
- Enhanced system computational capabilities and expanded hardware support by integrating multiple hardware components, such as GPUs and NPUs. This integration played a crucial role in optimizing system performance.

SmartMore Shenzhen, China
Computer Vision Algorithm Engineer Jun 2022 – Dec 2022

- Analyzed industrial image data and preprocessed datasets based on defects with multiple data augmentation methods to enlarge the dataset and add variance to data, therefore enhancing the model's robustness and prediction accuracy
- Improved SmartMore's SMAP codebase, a full-functional modularized AI training codebase, by adding new features such as label area filter, multi-channels image augmentation, and auto machine learning (hyper-parameter search)
- Applied an auto machine learning algorithm to search the optimal hyper-parameter settings for defect segmentation tasks on Airpods spiale, and designed SDK for further algorithm development and project management

Research Experience

Point-cloud-based Scene Augmentation, Master Research Project Singapore
Supervised by Guosheng Lin (Associate Professor, NTU) Jan 2023 - Nov 2023

- Developed a novel multi-modal deep neural network for 3D scene augmentation based on text instructions. Used PointNeXt and BERT as feature extractors, Transformer Decoder as feature fusion module, and Point-E as point cloud generator. Applied diffusion model and cross-attention mechanism to generate realistic and consistent objects in the desired locations.
- Designed a data pipeline to transform existing visual grounding dataset into generative instructions. Employed prompt engineering and large language models (GPT-3.5 and GPT-4) to paraphrase descriptive texts into generative texts. Applied rule-based filtering and manual correction to ensure the quality of the transformed dataset.
- Evaluated the performance of the proposed method on various metrics and tasks. Compared the results with baseline models and ablation studies. Demonstrated the diversity, effectiveness, and quality of the generated objects and scenes. Used visual grounding analysis to assess the recognizability of the augmented scenes.

Intriguing Properties of Long-tailed Recognition Problem, Final Year Project Hong Kong, China
Supervised by Jiaya Jia (Professor, CUHK) & Bei Yu (Associate Professor, CUHK) Sep 2021 - May 2022

- Researched and gained insights into methods on long-tailed recognition problem; reproduced and analyzed the experiment results of different approaches to compare their features and find their relationship using Pytorch
- Found and verified that the influence of batch size setting can be different on different classifier retraining methods, conducted further research on different methods' influences on model's prediction variance

Unified Feature Fusion Network with Path Router for Multi-task Image Restoration, Non-Territories Network Lab, School of Electronics and Communications Engineering, Sun Yat-sen University Guangzhou, China
Supervised by Congduan Li (Associate Professor, Sun Yat-sen University) Jun 2021- Aug 2021

- Applied data augmentation methods including CutOut, MixUp and CutMix using Python to enlarge the training dataset.
- Programed the AI agents based on Multi-task Learning with Multi-gate Mixture-of-Experts (MMoE) in Pytorch
- Evaluated model performance and adjusted to acceptable results, collected and analyzed experiment data for paper writing