LUO JIAYUN

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EDUCATION

University of British Columbia **(UBC), Ph.D. in Computer Science** Sep 2024 – Present

- Advisor: Leonid Sigal | AML-TN Scholarship
- Research Interest: Multimodal Large-Language Model, Interpretability and Vision-Language Reasoning.

Nanyang Technological University **(NTU), M.Phil. in Computer Science** Jan 2022 – May 2024

- **GPA: 4.5/5.0 (First Class) |** Thesis: PnP-OVSS (CVPR'24)
- Advisor: Li Boyang

University of California, Los Angeles **(UCLA), Bachelor of Science, Statistics** Sep 2018 – Mar 2020

- **GPA: 3.96/4.00** (Summa cum laude, Top 1%)

PUBLICATION

- **Jiayun L**, Rayat H, Boyang L, Leonid S. "Barking Up The Syntactic Tree: Enhancing Emergent Visual Grounding with Syntactic Losses." (under submission, Link)
- **Jiayun L**, Siddhesh K, Leonid S, Boyang L. "Emergent Open-Vocabulary Semantic Segmentation from Off-the-shelf Vision-Language Models." *CVPR, 2024*. (Link)
- **Jiayun L**, Boyang L, Cyril L. A Survey of Computer Vision Technologies in Urban and Controlled-environment Agriculture. ACM Computing Surveys, 2023. (Link)
- Weiwei J, **Jiayun L**, Miao H, Weixi G. Graph Neural Network for Traffic Forecasting: The Research Progress[J]. ISPRS International Journal of Geo-Information, 2023. (Link)
- Weiwei J, **Jiayun L**. Graph neural network for traffic forecasting: A survey. Expert Systems with Applications, 2022. (Link)
- Weiwei J, **Jiayun L**. Big data for traffic estimation and prediction: a survey of data and tools. Applied System Innovation, 2022. (Link)
- Weiwei J, **Jiayun L**. An evaluation of machine learning and deep learning models for drought prediction using weather data[J]. Journal of Intelligent & Fuzzy Systems, 2022. (Link)
- **Jiayun L**. Bitcoin price prediction in the time of COVID-19[C]. 2020 Management Science Informatization and Economic Innovation Development Conference (MSIEID). IEEE, 2020. (Link)

RESEARCH & PROJECT

The information flow of MLLM and the role of Attention Sink

- Role: Independent Research Feb 2025 – Present
- Investigate and interpret the information flow in prevailing MLLMs such as LLaVA using attention mechanism.
- Proposed a method to dynamically weight attention sinks and non-sink features, enhancing model performance by up to 3.0% (for now) on multiple QA tasks and hallucination datasets.

Barking Up The Syntactic Tree: Enhancing VLM Training with Syntactic Losses

- Role: Independent Research Aug 2024 – Present
- Proposed a HIerarchically STructured weakly-supervised framework (HIST), based on syntactic parsing, that improved image-text alignment in VLM training.
- Proposed two novel loss functions: (1) Subject Loss to ensure image alignment with both object-centric phrase and the subject, and (2) Addition Loss to encourage equal attention across multiple objects in a phrase.
- HIST outperforms baseline VLMs, achieving up to +9.8% improvement in visual grounding, +6.3% in multi-object referring segmentation, +1.1% in image-text retrieval, and +0.2% in visual question answering.

Emergent Open-Vocabulary Semantic Segmentation from Off-the-shelf Vision-Language Models

- Role: Independent Research Apr 2023 – Nov 2023
- Proposed to combine GPT4o, text-to-image attention, GradCAM, and Salience DropOut to iteratively acquire accurate segmentation of arbitrary class(es) from pretrained VLM.
- Proposed a contrastive reward function based on CLIP for hyperparameter tuning.

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- Obtained substantial improvements over a comparable baseline (+26.2% mIoU on Pascal VOC, +20.5% mIoU on MS COCO, +3.1% mIoU on COCO Stuff and +3.0% mIoU on ADE20K).

Panoptic Scene Graph Relation Classification Challenge

- Role: Individual Participant Sep 2022 - Nov 2022
- Achievement: Ranked 2 out of 120 (Top 2%) [Codalab Challenge Link]
- Trained a refined CLIP model with focal loss to classify three salient relations for each image from 50 possible relations.

A Survey of Computer Vision (CV) Technologies in Urban and Controlled-environment Agriculture (CEA)

- Role: Independent Research Apr 2022 - Sep 2022
- Discussed five key subareas of CV related to CEA and five major CV applicable CEA tasks.
- Identified four potential future directions for research in CV for CEA.
- Surveyed the state of the art as reflected in 68 technical papers and 14 vision-based CEA datasets.

Sharpened Dynamic Pseudo Labeling for Complex Affects Analysis

- Role: Teamwork Feb 2022 – Apr 2022
- Proposed a Sharpened Dynamic Pseudo Labeling framework (SDPL) to classify complex affects with limited and unbalanced data, by balancing quality and quantity of pseudo labels in semi-supervised pseudo labeling learning.
- Achieved superior accuracy over supervised method on the English tweets dataset from SemEval-2018 Task 1 (+7.5 on overall F1 Score and up to +35 F1 Score for minority affects).

WORK HISTORY

Flywheel Digital, Shenzhen, China & Singapore Aug 2021 – Jan 2022

Data Analyst

- Utilized NLP models and ML models to provide insights on sales or promotion strategies and formulate executable business plan for top FMCG companies.
- Finished six projects with a total annual contract worth of around 10+ millions RMB (2+ millions SGD), including Advertising Assessment, Sales & Share Analysis, and Reviews/PR crisis defense.
- Applied data visualization tools (Tableau, Python Matplotlib & Plotly) to effectively communicate business insights.

Qhdata, Shenzhen, China Jan 2021 – Aug 2021

Data Analyst

- Lead customer need analysis, which facilitates the construction of a business intelligence (BI) operation system for Statistics Bureaus of Shenzhen and Huizhou.
- Designed BI interface that allows the government of Yangzhou city to monitor economic indexes as well as operation of enterprises.

Scholarship & Awards

- Ministry of Education (MoE) Tuition Stipend, Singapore Jan 2022 – Dec 2023
- WeBank-NTU Joint Research Center Student Assistant Stipend, Singapore Apr 2022 – Mar 2024
- A*STAR ACIS PhD Scholarship (6300 SGD per month, Successful application), Singapore Mar 2024
- UBC AML-TN Funded Trainee Scholarship, Canada Jan 2025 - Jan 2026

OTHERS

- **Programming Languages** Python, R, MySQL
- **Frameworks & Tools** PyTorch, LAVIS
- **GRE** 333+3 (V164+Q169) 07/14/2020