Shun Liu

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EDUCATION

SHANGHAI UNIVERSITY OF FINANCE AND ECONOMICS *(211)*
Bachelor of Computer Science *September 2021 – May 2025*

- **Selected Courses**: Algorithm Design and Analysis, Machine Learning, Deep Learning, Artificial Intelligence, Python, Data Structure, Software Engineering, Data Analysis and Visualization
- **Mathematics**: Linear Algebra, Probability Theory, Statistics, Advanced Mathematics (Engineering), Discrete Mathematics, Graph Theory, Operations Research
- **Research Interests**: Reliable LLMs, Multi-model Learning and Medical Artificial Intelligence.

RESEARCH EXPERIENCE

Aug 2023 – Dec 2023 | Protein Sequence Modeling and Function Prediction [Competition]
Project Leader **Kaggle Gold Medal (Top 15/1625)**

- **Biomolecular Structure Modeling**. Based on the theory of **Gene Ontology** (GO), three directed acyclic graphs (DAG) were used to represent the biological processes, cellular components and chemical functions of protein molecules, association indicates the existence of semantic association (partial attribution, significant influence).
- **Protein Function Prediction**. The function was defined as a subset of the DAG graphs, and ProFun, QuickGO, SPROF 's proof codes were fused for GO graph reconstruction. The GO-based-method was highly expressive and efficient in downstream tasks compared to sequence alignment.

Oct 2023 – Jan 2024 | Value System and Potential Group-Dependent Bias in LLMs
Core Member **Academic Paper (Collaboration:** Dr. Weicheng Ma**)**

- **LLM bias.** Nowadays, the popularity of large language models (LLMs) in varied fields delivers the **LLM safety** popularity. The study of large-scale bias is in line with the cutting-edge researches of 5 trustworthy attributes: 'Fairness/Reliability/Robustness/Privacy/Interpretability', to explore whether LLM's attitudes toward different groups are consistent and influenced by human values.
- **Qualitative Analysis**. Qualitative experiments on multilingual LLMs of various scales are conducted to examine theoretical assumptions (whether LLMs possess group-dependent value?), and do ablation studies on RLHF, which marks an initial trial in this realm.

Oct 2023 -- Present | Towards Tuning PLMs for Compositional Zero-Shot Learning
Core Member **Academic Paper (Collaboration:** Dr. Zhuo Chen**)**

- **PLM-based ZSL Alignment Framework**. Based on the pre-training language model, the ability of visual-text contrastive learning is transferred to align multi-modality efficiently, low-resource learning and open-set scenarios(CZSL) are introduced to prove the generalization capability.
- **Effectiveness.** By leveraging the prowess of **pretrained language models** (PLMs), attribute attention weights are proposed to capture the multi-granularity information on instances.

June 2023 – Dec 2023 | A Real-time Yet Memory-Efficient Medical Imagery Detection Model [Paper]
Project Leader **Academic Paper (Mentor:** Prof. Teoh Teik Toe**)**

- **DL-based Detector**. Based on the insufficiency of **YOLOv8** algorithm in multi-scale target detection, a dynamic adaptive detection head is proposed to solve the diversity of object sizes.
- **Class Imbalance**. Combined with the DFL loss, the phenomenon of uneven-distributed medical

images in BCCD dataset is handled, results have proven the effectiveness (**mAP@50 above 0.90)**.

INDUSTRY EXPERIENCE

Mar 2024 – Present | Cardinal Operations website
Research Intern.

- **LLM-based Feature Engineering.** Employing large language models (LLMs) to automate tabular data analysis and innovate a semi-supervised method being employed in complicated scenarios (Retail & FMCG, Manufacturing, Energy, etc.) within heterogeneous high-dimension statistics.
- **LLM Knowledge Injection.** In order to facilitate LLM with domain generalization and problem-solving capability, we develop a finetuning method for PLM in few-show settings, to boost its modeling and coding strengths in operation research (OR) realms.
- **Outlet.** An on-progress academic paper.

Aug 2023 – Jan 2024 | Artificial Intelligence Research Institute, ZheJiang Lab
Research Intern **Mentor:** Dr. Hongsheng Wang | Prof. Shengyu Zhang

- **Research Topics.** Tracking the latest research in the field of 3D human body reconstruction in computer vision, exploring how to build a human joint rotation distribution model, and focusing on the reconstruction of spatial-temporal information, by flow-based or diffusion-based methods.
- **Academic Writing**. Participate in conference documentation and patent writing (second leader in charge), focus on multi-modal text-driven digital avatar generation, this research leverages the alignment of cross-modal data (text-image) and the training strategy for learning from few samples.

Nov 2023 – Jan 2024 | China National Nuclear Corporation (CNNC) 8th Research Institute
Algorithm Engineer

- **Industrial-based Computer Vision**. A real-time and efficient computer vision algorithm is designed for industrial defect detection. The detection recall rate is higher than 95%.
- **Website Development**. Develop web application of multi-instrument real-time monitoring penal and digital assistant Q&A user interface using unified *vue*/*uniapp*/*flask* framework.

PUBLICATION

Under review(first author, † corresponding author)***

Haoyi Zhang, **Shun Liu***, Siyuan Lin*, Zhaozhao Ma, Yang Han, Zhenghan Chen†, Jiechao Gao. "Adaptive Robust Classification: Integrating Distributional Resilience with Semi-supervised Learning in Medical Imagery", The 18th European Conference on Computer Vision (**ECCV'24**) **(CCF-B)***

Weicheng Ma, Ethan Gearey*, **Shun Liu**, Lili Wang, Soroush Vosoughi†. "Dissecting Values in Language Models: A Comprehensive Analysis of Stereotyping Behaviors and Their Implications in LLMs", (**ACL Rolling Review 2024 February, will submit to EMNLP'24**) **(CCF-B)***

Preprint

***Shun Liu*,** Jianan Zhang, Ruocheng Song, Teik Toe Teoh†. "ADA-YOLO: Dynamic Fusion of YOLOv8 and Adaptive Heads for Precise Image Detection and Diagnosis", The Cognitive Science Society*

***Shun Liu*†,** Kexin Wu, Chufeng Jiang, Danqing Ma. "Financial Time-Series Forecasting: Towards Synergizing Performances and Interpretability Within a Hybrid Machine Learning Approach"*

***Shun Liu*,** Jiaxi Yang†. "Model-Agnostic Interpretation Framework in Machine Learning: A Comparative Study in NBA Statistics"*

SKILL & HONOR

HONORS:

- **Gold** medal in China Collegiate Algorithm Design & Programming Challenge Contest
- **Top 1%** (Solo) Team in Kaggle CAFA 5 Protein Function Prediction
- **Top 2%** Team in Kaggle LLM Science Exam
- **Top 8%** in NLP Comp Linking Writing Processes to Writing Quality

SKILLS:

- **Technical Languages**: Python (Pandas, PyTorch, NumPy, Scikit-learn. etc.), R(ggplot2), C/C++, HTML/CSS, JavaScript, SQL.
- **Language**: English (Professional, IELTS: 6.5) and Mandarin (Native).
- **Miscellaneous**: Linux, Shell (Bash/Zsh), \LaTeX (Overleaf/R Markdown), Tableau, Microsoft Office, Firebase, Git.
- **Soft Skills:** Time Management, Teamwork, Problem-solving, Documentation, Engaging Presentation.
- **Interests**: Basketball, Reading