Li Runze

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RESEARCH INTERESTS

- Data Processing and Mining
- Graph Computing for Large-Scale Social Network
- Computational linguistics and Multimodal

EDUCATION BACKGROUND

School of Management and Engineering, Nanjing University (NJU)   9/2021-7/2025
Major: Computer and Financial Engineering | **GPA**: 4.43/5.0 (**Ranking**: 11/40)

Department of Electrical Engineering and Computer Sciences, UC Berkeley   8/2024-12/2024
Courses: Discrete Mathematics, Data Structures and Financial Algorithm, Algorithm Design &Analysis, Stochastic Processes, Object-oriented Programming, Foundations of Computer Networks, Digital Logic and Computer Organization, Digital Image and Video Process, Introduction to Machine Learning

Honors: People's First Prize Scholarship (2/40) | People's Second Prize Scholarship

PUBLICATION

- *Zheyuan Zhang, **Runze Li**, Jordan Boyd-Graber, Tasnim Kabir. NAVIG: Natural Language-guided Analytics with Vision-Language Models for Image Geo-localization*, under review of ACL 2025

RESEARCH EXPERIENCES

RA(Remote), University of Maryland   7/2024-Present
Supervisor: Professor Jordan Boyd-Graber

- Engaged in a research project focused on advancing geolocation techniques for accurately determining the location of images using language clues.
  - Developed an automated pipeline using Python and OpenCV to extract Google Street View images and corresponding geolocation data from YouTube videos, capturing up to 3,000 data points and expert performance metrics.
  - Co-maintained the Awesome-Geolocalization list, summarizing key research trends and insights in image geolocation, which provided a strong foundation for the project's literature review.
  - Researched and analyzed major datasets for image geolocation, from early social media datasets like im2gps3k and yfcc4k to recent street-view sets like Google-World-Street 15K, and established a comprehensive evaluation pipeline.
  - Reproduced and benchmarked state-of-the-art models, testing them across multiple datasets and establishing performance baselines to guide further research.
  - Proposed and developed the MicroAnalyzer framework, actively contributing to brainstorming, coding, and tool invocation design, while exploring methods for clue quality assessment, despite experimental limitations.
  - Conducted large-scale experiments, including ablation studies, and compared results to state-of-the-art models, analyzing the impact of each framework component.

RA(Remote), University of Rochester   7/2024-9/2024
Supervisors: Professor Duan Zhiyao

- Engaged in a research project focused on advancing deepfake detection techniques to address the broader spectrum of video and audio manipulation beyond facial forgeries.
  - Developed an automated pipeline using Python and TensorFlow for generating large-scale general deepfake audio and video datasets, addressing the current lack of diverse training data.
  - Utilized Generative Adversarial Networks and Transformer models to create realistic deepfake content, ensuring a wide variety of manipulations for robust detection training.
  - Introduced Vision-Language Models as classifiers for general deepfake detection, leveraging models such as CLIP and BLIP for multimodal analysis and enhancing the interpretability of detection results.
  - Implemented data augmentation and adversarial training techniques to improve model robustness and generalizability to various deepfake scenarios.
  - Trained a baseline convolutional neural network (CNN) and transformer-based model on the generated dataset using PyTorch, establishing a benchmark for subsequent model comparison and development.
  - Conducted extensive model evaluation using precision, recall, F1 score, and ROC-AUC metrics, and optimized hyperparameters with grid search and cross-validation techniques.

RA, Distributed Computing Lab (Dislab)   10/2023-7/2024
Advisor: Professor. Li Wenzhong (Department of Computer Science and Technology, NJU)

- Conduct research to advance video super-resolution techniques for enhancing video quality and resolution.
- Designed and implemented advanced algorithms leveraging deep learning and computer vision methodologies to address challenges in video super-resolution.
- Explored and experimented with cutting-edge techniques, including convolutional neural networks (CNNs), recurrent neural networks (RNNs), and generative adversarial networks (GANs), to improve the resolution of low-quality videos.
- Optimized model architectures and hyperparameters to achieve superior performance in video super-resolution tasks.

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Leader, Research on Multi-Object Detection-Based Pedestrian Tracking Methods · 11/2023-12/2023

- Develop and design a pedestrian detection and feature extraction method based on YOLOv8, integrated with neural networks and advanced matching algorithms to enhance tracking accuracy and stability. Key steps included:
  - Employed YOLOv8 for efficient pedestrian detection to improve detection accuracy and speed.
  - Applied a CNN-based architecture to accurately extract features of pedestrians, enhancing the tracking algorithm's ability for individual identification.
  - Integrated greedy and Hungarian algorithms to optimize the feature-matching process, thereby improving the continuity and stability of tracking.
- Composed a comprehensive research paper detailing our methodology, experimental setup, results, and conclusions.

Member, Machine Learning for Stock Price Prediction · 10/2022-10/2023

- Took part in a project focused on utilizing machine learning methods for accurate stock price prediction in the dynamic Chinese capital market. My contributions included:
  - Replicated and validated the Black-Litterman Model, a sophisticated portfolio optimization technique widely used in finance, demonstrating proficiency in model implementation and validation techniques.
  - Replicated and fine-tuned a hybrid CNN+LSTM prediction model, integrating convolutional neural networks (CNN) and long short-term memory (LSTM) networks.
  - Engaged in comprehensive hyperparameter tuning and model optimization to enhance the robustness and accuracy of stock price forecasting.
  - Conceptualized and developed a locally hosted website (not deployed) to demonstrate the practical application of the replicated models in stock price forecasting.
  - Implemented interactive visualizations, model explanations, and performance metrics on the website to demonstrate the models' effectiveness and utility in real-world scenarios.
- Awarded the school-level outstanding project.

ACADEMIC EXPERIENCES

Individual Project, Smart Assistant App Development and Deployment · 5/2024-10/2024

- **Backend Development:** Independently built a high-efficiency backend server for optimal stability and performance.
- **Payment and Subscription Management:** Integrated Google Play billing, managing payment flows and subscription logic; developed a user balance system for purchases, renewals, cancellations, and upgrades; utilized Google Billing Pub/Sub for real-time updates; established daily/weekly refresh mechanisms; migrated payment processing to Supabase for enhanced efficiency.
- **Security and Authentication:** Implemented JWT for secure authentication with Bearer tokens and auto-refresh to minimize disruptions.
- **Server Deployment and Logging:** Deployed AWS EC2 instances, configured domains, and set up SSL for secure access; created a logging system with hourly rotation for effective monitoring; used FastAPI to optimize client interactions and ensure efficient OpenAI API connectivity.
- **Published on Google Play:** Successfully launched the app on the Google Play Store.

Member, 19th Citi Financial Innovation Application Competition · 1/2024-3/2024

- Joined a team to optimize the equity structure diagram of listed companies using artificial intelligence to enhance information accuracy and precision. My contributions included:
  - Implemented Graph Convolutional Networks (GCN) to classify different companies into risk categories based on their equity structure diagrams.
  - Leveraged the graph-based nature of GCN to capture complex relationships and dependencies within the equity structure diagrams for accurate risk classification.
  - Selected the Hierarchical Graph Pooling with the Structure Learning model as the foundational model for our task.
  - Conducted structural modifications to the model to better adapt it to the specific requirements of financial domain tasks, ensuring its effectiveness in optimizing equity structures.
- Ranked Top 20 nationwide.

EXTRACURRICULAR ACTIVITIES

Member, Cloud-Based Voluntary Teaching Program · 7/2022-9/2023

- Utilized various online teaching tools and platforms to provide math and computer science tutorials for rural students and employed online education technology to integrate educational resources and enable real-time communication, enhancing remote learning experiences.

TECHNICAL SKILLS

- **Programming Languages:** C++, Python
- **Libraries and Tools:** PyTorch | Scikit-Learn | Pandas | NumPy | Transformers | OpenCV | SciPy