Ruize Xu

rick-xu315.github.io

E-mail : xrz0315@ruc.edu.cn
Mobile : +86 188 0543 0315

Education

- **Renmin University of China** — Beijing, China
  B.S. in Data Science and Big Data Technology — *Sept. 2019 – June 2023 (Expected)*
  GPA: 3.83/4.0 (WES 3.93/4.0), **Ranking**: top 10%
  Coursework: Programming (C/C++), Data Structure and Algorithm (C/C++), Intro Database (SQL/Javascript), Machine Learning (Sklearn/Tensorflow), Distributed System (Spark/Hadoop), Parallel Computing and Software Design (R/Pyspark), Foundations of Computer Systems (Linux/Assembly, in progress), Design and Analysis of Algorithms (In progress)
  Teaching Assistant: Python Programming and Application
- **University of California, Davis** — Davis, USA
  Visiting Student — *Jan. 2022 – Apr. 2022*
  GPA: 3.90/4.0 (Certificate of Academic Exellence)
  Coursework: Discrete Mathematics for Computer Science, Statistical Data Science, Time Series Analysis

Research Interests

- **Multimodal Learning**: Building multimodal systems for representation learning and machine perception.
- **Trustworthy Machine Learning**: Designing fair, robust and efficient ML methods.

Publications & Manuscripts

- Ruize Xu, Ruoxuan Feng, Shi-Xiong Zhang, and Di Hu. **MMCosine: Multi-modal Cosine Loss Towards Balanced Audio-visual Fine-Grained Learning**, *ICASSP 2023 Accepted* [paper].
- Kenan Jiang, Xuehai He, Ruize Xu, and Xin Eric Wang. **ComCLIP: Training-Free Compositional Image and Text Matching**, *ICCV 2023 Under Review* [paper].

Research Experience

- **Department of Computer Vision Technology, Baidu Inc.** — Beijing, China
  Neural Radiance Field for Urban Scene Reconstruction — *Nov. 2022 – May 2023 (Expected)*
  Research Intern, advised by Yumeng Zhang and Minyue Jiang
  - Designed NeRF-based methods to reconstruct unbounded urban scenes from a few images. Constructed exposure and appearance embedding to handle the climate variance.
  - Built independent encoder branches to disentangle scenes and objects, with time-related deformation encoding for dynamic object generation. The combined framework achieved urban scene reconstruction.
- **Eric Lab, University of California, Santa Cruz** — Santa Cruz, USA
  Training-Free Compositional Image and Text Matching — *Sept. 2022 – Nov. 2022*
  Research Intern, advised by Prof. Xin Eric Wang
  - Mitigated the spurious correlations introduced by the pretrained CLIP models in fine-grained image-text matching. The proposed causal framework disentangled input images into subjects and objects entities.
  - The proposed method boosted the zero-shot inference ability of CLIP without pre-training or fine-tuning.
- **GeWu Lab, Gaoling School of AI, Renmin University of China** — Beijing, China
  Towards Balanced Audio-visual Fine-Grained Learning — *Oct. 2021 – Oct. 2022*
  Research Intern, advised by Prof. Di Hu
  - Proposed a multimodal cosine loss that performed modality-wise normalization to learn hyperspherical feature embeddings, alleviated the imbalanced optimization within multimodal fine-grained learning
  - The proposed method outperformed baselines on speaker verification, emotion recognition, and bird categorization by large margins. Proved the upperbound of key parameters and the versatility with advanced fusion strategies.

- **Center for Applied Statistics, Renmin University of China** Beijing, China
  Multimodal Graph Neural Network for Micro-video Recommendation *Apr. 2021 – June 2022*

  Research Intern, advised by Prof. Xiaoling Lu

  - Employed DGL to generate user-item bipartite GCN and GAT from acoustic, text and visual information of raw micro-videos. Aggregated the sub-graphs with dynamic weights by cross-modal attention.
  - The proposed method outperformed baselines by large margins on industrial data from Byte dance grand challenge in ICME 2019. The project was selected as RUC Undergraduate Excellence Research (24/320).

Selected Projects

- **The Influencing Factors of Covid-19 Spread** [Report] *Jan. 2022 – Mar. 2022*

  Course Project of STA141A: Statistical Data Science, UCD (Rated 1st)

  - Used ggplot2 and gganimate to do comprehensive data visualization on WHO Covid dataset. Used two-way ANOVA to verify the influencing factors of Covid-19 spread with model diagnosis and sensitivity analysis.

- **Deep Reinforcement Learning for Real-time Portfolio Decision** [Paper] *Feb. 2022*

  Mathematical Contest In Modeling 2022, Meritorious Winner (Top 7% of 15105 teams world-wide)

  - Used the DRL tool gym to build a trading environment. Used PPO algorithm to do entangled price prediction and trading decision for bitcoin and gold portfolio based on a strategy of sliding window for train-valid set split.
  - Designed a turbulence threshold to handle the market collapse and a soft constraint for cyclic market closure. The total assets expanded to 60 times the principal amount with the proposed method.

- **Online Shopping System** [Code] *Oct. 2021 – Dec. 2021*

  Course Project of Introduction to Database Systems (Rated top 5 of 104)

  - Designed a user-friendly online shopping system with specialization for buyers, sellers and administrators. Utilized SQL Server for back-end data management, Bootstrap for webpage design, and Flask for WSGI web application.
  - Achieved various user-specific operations, including shopping cart management, store and item management, review system and account management. Used MD5 to encrypt passwords and timestamp for concurrency control.

Honors&Awards

- **RUC 1st Prize Scholarship for Academic Excellence (top 5%)** *2022*
- **RUC President Scholarship for Exchange Students** *May 2022*
- **UCD Certificate of Academic Excellence** *Mar. 2022*
- **RUC Undergraduate Research Fund** *Nov. 2021*
- **RUC Dean's MingDe Data Science Talents Nomination (17 out of 321)** *May 2021*
- **RUC 2nd Prize Scholarship for Academic Excellence (top 10%)** *2020, 2021*
- **National 1st Prize of The Chinese Mathematics Competitions** *Nov. 2020*

Skills

- **Programming Languages**: C/C++, Python, R (dplyr, ggplot2), SQL, Matlab, HTML/CSS
- **Tools/Frameworks**: Linux, Git, Hadoop, Spark, HDFS, Flask, Bootstrap, LaTeX
- **Packages**: PyTorch, Tensorflow/Keras, Transformers, WandB, Horovod, Diffusers, OpenCV, NumPy, Pandas, Scipy, Sklearn, Matplotlib, Seaborn, Pyspark

Certificated Online Course

- **Coursera**: Computer Organization, Operating Systems, Linux Foundamentals