Zhangyi Hu

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EDUCATION

Wuhan University **Wuhan, China**
School of Computer Science
Bachelor of Engineering in Computer Science and Technology **Sept. 2021-Jun. 2025**
Current Average Score: 91.049% **Current GPA:** 3.87/4.0
Scholarship: Wuhan University Hongyi Honor College First Class Scholarship (5%), 03/2023; **National Scholarship (3/162), 09/2022**; Wuhan University Excellent Student and First Class Scholarship (5%), 09/2022; Wuhan University Merit Student Award (10%), 09/2022; Freshman Admission Scholarship(top 5%), 09/2021

PATENT

Zhiyong Gao, Yuhao Lin, Guozheng Zhang, **Zhangyi Hu**, Hao Luo, Haoping Tan, "Exhibition Remote Construction and Integrated Service System v1.0 Based on Corrugated Paper Model", Mar. 2023-May 2023, Register No.: 2023SR0581361

RESEARCH EXPERIENCE

Empowering Visible-Infrared Person Re-Identification with Foundation Models **Jul. 2023-May 2024**
Independent Research Project | Sensing Intelligence and Machine Learning Lab | Supervisor: Prof. Mang Ye
https://whu-hzy.github.io/publications/

- **Background:** Visible-Infrared Person Re-identification (VI-ReID) often underperforms compared to RGB-based ReID due to significant modality differences, primarily caused by the absence of detailed information in the infrared modality. With the development of Large Language Models (LLMs) and Language Vision Models (LVMs), this motivates us to investigate a feasible solution to empower VI-ReID performance with off-the-shelf foundation models. To this end, we propose a novel text-enhanced VI-ReID framework driven by Foundation Models (TVI-FM)
- **Aims:** To enrich the representation of the infrared modality with automatically generated textual descriptions to seamlessly enhance the performance of existing VI-ReID frameworks.
- **Specific Measures:** We incorporate a pretrained multimodal language vision model (LVM) to extract textual features augmented by LLM and incrementally fine-tune the text encoder to minimize the domain gap between generated texts and original visual images. Meanwhile, to enhance the infrared modality, we leverage modality alignment capabilities of LVMs and LVM-generated feature-level filters. This allows the text model to learn complementary features from the infrared modality, ensuring semantic structural consistency between the fusion modality and the visible modality. Furthermore, we introduce modality joint learning to align features of all modalities, ensuring that textual features maintain stable semantic representation of overall pedestrian appearance during complementary information learning. Additionally, a modality ensemble retrieving strategy is proposed to consider each query modality for leveraging their complementary strengths to improve retrieval effectiveness and robustness
- **Results:** Extensive experiments demonstrate that our method significantly improves retrieval performance on three expanded cross-modal re-identification datasets, paving the way for utilizing foundation models in downstream data- demanding tasks
- **Progress:** Submitted an article *Empowering Visible-Infrared Person Re-Identification with Foundation Models* at the **NIPS** in May 2024

COMPETITION EXPERIENCE

Third Award, China Mathematical Modeling Contest for College Students **Nov. 2023**
Leader | Member: 3

- Aimed at studying the seabed paths surveyed by survey vessels
- Encountered two difficulties about modeling and computation. One is the seabed is uneven and involves the culculation of intersection line of flat and curved surfaces, the other is to ensure that the coverage overlap between the surveyed lines on both sides of two parallel line segments and the seabed intersection area is controlled within the range of 20% to 0%. It's hard to model the seabed, intersection lines and calculate overlapping area based on them.
- Chose a forth-order three-dimensional parametric surface equation to build the seabed surface model, utilize the Monte Carlo sampling method to Approximate integration and Calculate the overlapping area of the coverage area multiple times

First Award, China University Computer Design Competition (Central South Division) **Jun. 2023**
Leader | Member: 5

- Completed most of the technical code-related tasks(80%), including the core aspects of the game such as game mission dialogues, asset management, mission movement, animation background, comic music scrolling playback control, mechanism triggering, monster movement logic, scene switching, and parkour mini-games within scenes

- Gained proficiency in Unity 2D game development and effectively demonstrated my leadership and teamwork skills

Second Award, Huazhong Cup Mathematical Modeling Challenge for College Students **May 1, 2023-May 3, 2023**
Leader | Member: 3
- Analyzed the correlations between various pollutants and overall air quality data sets; Collaboratively conducted controlled experiments, identified the optimal experimental conditions to obtain the best model settings; Finally, based on historical pollutant data and overall air quality data, predicted the overall air quality for the next several days to even a dozen days

Second Award, CCFSinan Cup Quantum Computing Programming Challenge **Apr. 2023-May 2023**
Organized by the China Computer Federation
Leader | Member: 5
- Developed an automated framework using the QAOA algorithm and the pyqpanda library to generate quantum circuits based on given inputs, enabling generation within specified time, depth, and accuracy constraints.
- Defined a loss function to optimize parameters of the quantum line model and evaluate its performance, utilizing the QAOA algorithm and optimizer to find the optimal parameter combination that minimizes the loss function. Through adjusting the number of layers in the quantum circuit through ablation experiments to find the depth with best balance of performance and computational cost for the task, we constructing the final quantum line.

The Second Award, The American Mathematical Contest in Modeling **Apr. 1st, 2023-Apr. 4th, 2023**
Organized by the National Science Foundation
Leader | Member: 3
- Predicted the final price of a ship based on various attributes such as region and ship characteristics, accompanied by explanatory interpretations
- Retrieved relevant information from the World Bank and sailing sales websites, then cleaned and performed feature engineering on the data to obtain a directly usable dataset
- Used the Shap method based on game theory, analyzed the contribution of each attribute to the final price, then identified several key elements leading to a discontinuity in influencing factors, set a threshold to filter out other unimportant factors, and reduced computational complexity using PCA dimensionality reduction, restructured features by extracting the dimensions with the highest linear correlation, finally utilized ensemble learning method to simultaneously regress the original and augmented features through multiple regression models to obtain the final result

PROJECT EXPERIENCES

Tripo Travelling Journals APP Development **Sept. 2023-Dec. 2023**
Programming and Writing Project Release Presentation Slides | Member: 7
- Mastered the backend development process of web apps, the Django framework and the HTTP request protocol for web applications; Gained experience in AI application development and can now proficiently integrate statistical learning and even state-of-the-art large-scale model technologies into applications
- Gained a comprehensive understanding of the overall process of software engineering, and self-studied databases, computer networks, software engineering, artificial intelligence, and the industrial application methods of probability theory in the current software development process

Academic Studies about Logic and Artificial Intelligence **Aug. 3rd, 2023-Aug. 7th, 2023**
Summer Research Schooling in Jilin University
- Learned a general semi-structured formalism for computational argumentation
- Understood artificial intelligence based on symbolic and traditional logical methods

Fine Control System for a Multi-modal (visual, tactile, mechanical information) Robotic Arm Based on Deep Reinforcement Learning PPO Algorithm
- Learned the theory of reinforcement learning and related code frameworks from scratch, practiced and successfully referred to other people's baseline to explore the benefits of multimodal information on the dexterity control effect of a robotic arm

TECHNICAL SKILLS

Language: English (6.5), Chinese (native)
Computer: Python (proficient), C++/C/verilog/latex/markdown (intermediate), html/C# (beginner)
AI Research Tool: ChatGPT4
ML/DL Framework: Pytorch
Backend Framework: Django