Shilei Cao

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Education

Sun Yat-sen University   *Guangdong, China*
B.E. in Artificial Intelligence   *Sept 2020 - Present*

- **GPA:** 3.8/4.0 (Top 20%)
- **Honors/Awards:**
    - The Meritorious Winner award in the Mathematical Contest in Modeling (May 2023)
    - The third-class University Scholarship (Oct 2021, Oct 2022)
    - The third prize in the Asia and Pacific Mathematical Contest in Modeling (Jan 2022)
    - The second price in the Epropulsion Cup Sailing Invitational Race (Oct 2022)
- **Courses:** Mathematical Analysis (97), Linear Algebra (98), Complex Functions (99), Matlab Language and Applications (94), Advanced Programming and Methods (92), Principles of Artificial Intelligence (91), Principles of Operating System (91), Pattern Recognition and Computer Vision (88.5), Natural Language Processing (87), Data Structures and Algorithms (87)

Research Experience

An Adaptive Training Tool for Critical Paper Reading   *Guangdong, China*
Human-computer Interaction Laboratory, School of Artificial Intelligence, Sun Yat-sen University
                                                                                                                                    Sept 2022 - Apr 2023
Research Assistant, Advisor: Zhenhui Peng

- **In a submission to the ACM Symposium on User Interface Software and Technology (UIST 2023) as co-first author**
- **Project description:** Develop a training tool for critical paper reading, which leverages text summarization techniques to train readers' skills in grasping the paper's main ideas and utilizes template-based generated questions to help them learn how to raise critical thoughts.
- **Main Responsibilities:**
    - **Formative Study:** Conducted interviews with 52 participants to recognize the difficulties that novice researchers encounter during critical paper reading; derived the design requirements for the tool based on the results of the literature review and interviews
    - **Summarization Model:** Deployed the BRIO model to generate reference summaries of the paper content; used the Bert model to evaluate the semantic similarity of sentences to prompt users of possible omissions or redundancies in the original text
    - **Critical Question Generation Model**: Utilized a sentence classification model to classify sentences; used the YAKE model for keyword extraction to fill the template critical question based on the corresponding sentence type to provide reference critical questions;
    - **Backend Implementation:** Implemented the backend of the tool through Flask framework to interact with the frontend
    - **User Experiment:** Conducted a mix-method and between-subject experiments after dividing 24 participants into two groups
    - **Data Analysis:** Perform reliability tests and Mann-Whitney tests on the experimental data in SPSS, and concluded that the tool could better improve participants' critical paper reading skills in raising more understandable, relevant, and critical questions after the training
- **Project Outcome:** Implemented a plugin based on the Google Docs platform, which can be used collaboratively by multiple people and save user-submitted records and backend-related data

Multi-robot cooperative pursuit   *Guangdong, China*
College Students' Innovative Entrepreneurial Training Plan Program, Sun Yat-sen University
                                                                                                                                    Dec 2021 - Dec 2022
Project core member, Advisor: Yunxiao Shan

- **Currently applying for two national invention patents**
- **Project description:** Researched the planning and control methods for single robots in limited environments with forbidden areas, and designed collaborative pursuit strategies which take advantage of the limited pursuit space and the number of pursuers to pursue single evader
- **Main Responsibilities:**
    - **Algorithm Implementation:** Implemented multi-robot pursuit algorithm by utilizing the Voronoi diagram to compute the reachable area to achieve obstacle avoidance and collision prevention
    - **Experiment** Conducted a contrast experiment and concluded that compared with the base algorithm, the success rate of pursuit increased by 30%, and the pursuit efficiency increased by 20%
- **Project Outcome:** Implemented a multi-robot collaborative pursuit algorithm that can avoid obstacles and collisions on the RoboMaster robot platform; concluded as the provincial project of College Students' Innovative Entrepreneurial Training Plan Program of Sun Yat-sen University

Skills

Programming: Python (Pandas, PyTorch, NumPy, Scikit-learn. etc.), C/C++, Matlab, SQL
AI Algorithm: Machine Learning, Natural Language Processing, Computer Vision, Statistical Analysis and Modeling

Interests

Basketball: The captain of the basketball team of the School of Artificial Intelligence, Sun Yat-sen University
Sailing: The member of the sailing school team of Sun Yat-sen University