

# 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 prize 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

Research Assistant, Advisor: Zhenhui Peng

Sept 2022 - Apr 2023

- **In a submission to UIST 2023 as the co-first author (Conditionally Accepted)**
- **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

Project core member, Advisor: Yunxiao Shan

Dec 2021 - Dec 2022

- **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