Guofei CHEN

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EDUCATION

Zhejiang University, Hangzhou, China *Sep 2019 - Jul 2023*
GPA: 3.95/4.0 ranking: 5/130
Bachelor of Science in Automation
Chukochen Honors College - Mixed Class (**4% in 3000**)
Research Interest: Multi-robot systems, Robot perception, Optimization

PUBLICATIONS

1. Zhichao Chen, Luyao Wang, **Guofei Chen**, Zhiqiang Ge. Probabilistic Generative Model with Long-Term Memory and its Application in Chemical Process Modeling. *International Symposium on Process Systems Engineering (PSE)*. 2021. [paper]

RESEARCH EXPERIENCE

Relative Localization in Swarm using Range Measurements June 2022 - Present
FAST Lab, Zhejiang University
Advisor: Prof. Fei Gao

- Proposed a **Vision-Inertial-UWB** tightly coupled state estimator for quadrotor swarm. Deployed multiple UWB tags on each agent and modelled the noise of UWB using Gaussian process. The state estimator could use the global relative range measurements to mitigate long-term drift in relative localization. [technical report]
- Working further on the topic of distributed global relative localization via convex relaxation.

RoboCup Small Sized League Team - ZJUNlict June 2020 - July 2022
State Key Laboratory of Industrial Control, Zhejiang University
Advisor: Prof. Rong Xiong, Dr. Zheyuan Huang

- Led the team on planning & motion control module, multi-robot defense module, and kick module. In charge of maintenance, code reviewing and responsive changes in matches. Reviewed more than 30,000 lines of code. We were awarded the champion among teams across the nation at *2020, 2021 RoboCup China Open*. [video] [news]
- Proposed a mapping and planning method that decreased the time consumed by planning module by **6 times**. Leveraged the features of the soccer field for mapping and designed an efficient recursive path searching method. This reduced the planning module time consumption from more than 60% to 10% per execution cycle and solved the bottleneck caused by planning efficiency, giving more possibilities to decision module at higher level.[technical report]

Soft Sensor based on Bayesian Inference Mar 2021 - June 2022
State Key Laboratory of Industrial Control, Zhejiang University
Advisor: Prof. Zhiqiang Ge, Dr. Zhichao Chen

- Proposed a structure in Gaussian Mixture Variational Autoencoder that uses Gumbel-Softmax reparameterization to accomplish multi-mode information mixture. The work solidated the theory of Gaussian Mixture Variational Autoencoder and improved the fitting accuracy (R^2: 0.92→0.997). The modified GM-VAE outperforms several state-of-art Auto-Encoders on real chemical processes. [code] [technical report]

- Collaboratively proposed **dynamic long-term memory probabilistic generative model** (*LTM-PGM*), the **first** to consider long-term feature extraction in data-driven chemical process soft sensor. Assumed the Markov property of latent variables, used GRU cells to generate latent space, and adpoted gated residual mechanism to estimate the transformation of latent space. By analyzing the evidence lower bound, the loss function that fits the SGD framework is derived strictly. LTM-PGM out-performs the strong benchmarks of Autoencoders and LSTM networks used in soft sensor.
- Paper on *LTM-PGM* was accepted by *Symposium on Process Systems Engineering*. [code][paper]

PROJECTS

TinySQL - An Original Relational Database Mar 2022 - Jun 2022
College of Computer Science, Zhejiang University
Adivisor: Prof. Yunjun Gao

- Built a relational database supporting SQL without using any third-party libraries (except the SQL parser). The project includes a catalog manager to manipulate the table header, an index manager to manipulate index files stored externally, a record manager to manipulate table data a buffer manager that abstracts the memory model.
- Architect of the project. Team leader, code reviewer (20,000+ lines). Designed the memory details of index files and table files. Implemented the index manager, record manager and buffer manager.
- Basic features include: SELECT Query, DELETE Query, INSERT Query, DROP Query. Other features include: Nested SELECT Query, A simple Execution Optimizer, Externally Stored Index, etc. [documentation] [code][post]

Vision-Based Electrical Transformer Inspection System Sept 2020 - Jan 2021
College of Electric Engineering, Zhejiang University
Advisor: Prof. Jianliang Zhang

- Built a vision-based inspector of electrical transformers and working conditions. Features include inspecting the state of transformer (e.g., oil pressure, water vapour concentration) by reading the output of analog devices, and analyzing the workers' behaviors.
- Implemented and trained *Faster-RCNN* for object detection and *Resnet-50* for object recognition. Used *"pytesseract"* for optical character recognition, and double check the result with an another light weight CNN. Designed a streamline for transformer inspection and built a web front end.

SKILLS

Programming: C/C++, Python, Lua, JavaScript, MATLAB
Robotics: Airsim, ROS, IoT Chips (STM32)
Machine Learning: PyTorch, OpenCV
Language: English (TOEFL: 111, S: 25), Mandarin Chinese