Sanbao Su

Storrs, Connecticut, USA

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QUALIFICATION

- Collaboration skills, project development with 50+ people and managed a team of 15 programmers.
- Strong object oriented programming experience: 9 years of C++ experience, 5 years of Python experience.
- Skilled at PyTorch, Tensorflow, C++ library (STL) and data structures.
- Strong research experience on autonomous vehicles, Computer Vision, AR and robotics.
- More than 2 years of full-time work experience as a software engineer in the world's top 500 companies, including the Autonomous Vehicle Dep, focusing on C++ coding, software design, and software systems.
- Several publications at conferences and journals, including ICRA, CVPR, ECCV, DAC, RAL, TMLR.

EDUCATION

Ph.D., Machine Learning, Department of Computer Science and Engineering **09/2021 – Present**
University of Connecticut, Storrs, CT, USA *GPA: 4.00/4.00*
Research field: Uncertainty Quantification, Perception, Reinforcement Learning, Vision Language Model

M.A., Electronic Science, Department of Electrical and Computer Engineering **03/2019**
Shanghai Jiao Tong University, Shanghai, China *GPA: 3.78/4.00*
Thesis: Novel Methods for Approximate Logic Synthesis Research field: EDA, approximate computing

B.S., Automation, Department of Automation **06/2016**
Nanjing University, Nanjing, China *GPA:4.45/5.00*

RESEARCH EXPERIENCE

Student Researcher **Google, Mountain View, CA, USA, 05/2024 - 08/2024**

- Design the semantic-aware localization and navigation algorithm for the indoor scenairo in AR Core group.

Research Assistant **Computer Science and Engineering, UCONN, CT, USA, 09/2021 - Present**

- Developed an uncertainty-aware camera-based 3D semantic scene completion method for autonomous vehicles, including uncertainty propagation and hierarchical conformal prediction. Outcomes: Experimental results showed our algorithm achieves a 14.61% improvement in accuracy and an 85% reduction in uncertainty. The paper has been submitted to Neurips 2024.
- Developed the uncertainty qualification algorithm for the 3D cooperative object detection of connected autonomous vehicles (CAVs) in order to improve the performance of the later module of autonomous driving such as prediction and planning (the first one to do it). Outcomes: Experimental results showed our algorithm achieves more than 4× improvement in uncertainty score and more than 3% accuracy improvement, compared with the state-of-the-art. Designed Algorithm, wrote code, conducted experiments, and analyzed the results with Pytorch on Python. The paper was accepted by ICRA 2023.
- Designing the state-adversarial multi-agent reinforcement learning algorithm. The paper was accepted by Transactions on Machine Learning Research (Second Author). Collaborated in designing a stable and efficient reward reallocation algorithm to efficiently reallocate the system's total reward to motivate stable cooperation among autonomous vehicles. The paper was accepted by ICRA 2022 (Third Author).

Research Intern **Bosch Research Center, Sunnyvale, CA, USA, 05/2023 - 08/2023**

- Developed a Vision Transformer-Assisted Active Testing for Label-Efficient Evaluation that provides computational efficiency, flexibility for tasks such as object detection and segmentation, and adaptability to varying levels of sample complexity (Active testing carefully selects the test points to label, ensuring sample-efficient model evaluation). Outcomes: Compared to baselines, achieve 6X improvement. Specifically, our approach achieves a 1.36% error rate in risk estimation with only 0.07% labels, which has 10X improvement compared to baselines. The paper was accepted by ECCV 2024.

WORK EXPERIENCE

Full-time Software Engineer **Shanghai Huawei Technologies Company, Shanghai, China, 04/2019 - 08/2021**
At the Autonomous Vehicle Software Department, 03/2021-08/2021:

- Wrote C++ 3KLoc, wrote 40+ test cases, and delivered 2 key requirements of the planning module of autonomous driving which are about planning with traffic lights in the Behavior Decision Maker Group.
- Experience on ROS and rule-based behavior decision algorithms of the autonomous vehicle.

At the 5G Software Development Department, 04/2019-03/2021:

- Wrote C++ 32.5KLoc, wrote 600+ test cases, and delivered 8 key requirements of gNodeB (embedded, RTOS).
- Refactored four function modules so that reduced 5KLoc, and improved the expandability and readability of codes; fully understand the concept of refactoring and clean code.
- Reviewed code of others for half a year, focused on functional, code style problems, and test case design.
- Optimized code performance for one year, mainly reduced memory fragmentation, such as replacing the memory allocation with the shared memory pool, removing memset and memcpy operations.
- Played the function owner in 4 key software projects, managed teams of 6-15 programmers, formulated the delivery plan, organized weekly meetings, constructed hardware experimental environment, tested codes, and finally submitted the codes without any basic function problems before the deadline.

Deep Learning Research Intern **Tocodec Information Tech. Company, Shanghai, China, 03/2018 - 06/2018**

- Used H266 as the baseline of image compression, designed one post-processing algorithm which is composed of convolutional layers and residual blocks with the Tensorflow framework on Python.
- Gained the comprehensive first prize at the 2018 CVPR Challenge on Learned Image Compression.

Skills

Languages: Python, C++, C, MATLAB, LaTeX.
Algorithm: Data Structure, Machine Learning, Deep Learning, Reinforcement Learning, Vision Language Model, Computer Vision.

SELECTED PUBLICATIONS (8/14)

- **Sanbao Su**, Nuo Chen, Juefei Xu, Chen Feng, and Fei Miao “Uncertainty-Aware Camera-based 3D Semantic Scene Completion”, submitted to 2024 Conference on Neural Information Processing Systems, under review.
- **Sanbao Su**, Xin Li, Thang Doan, Sima Behpour, Wenbin He, Liang Gou, Fei Miao, and Liu Ren “MetaAT: Active Testing for Label-Efficient Evaluation of Dense Recognition Tasks”, accepted by 2024 European Conference on Computer Vision.
- **Sanbao Su**, Songyang Han, Yiming Li, Zhili Zhang, Chen Feng, Caiwen Ding, and Fei Miao, “Collaborative Multi-Object Tracking with Conformal Uncertainty Propagation”, published on IEEE Robotics and Automation Letters. Website: coperception.github.io/MOT-CUP.
- **Sanbao Su**, Yiming Li, Sihong He, Songyang Han, Chen Feng, Caiwen Ding, and Fei Miao, "Uncertainty Quantification of Collaborative Detection for Self-Driving," published in 2023 IEEE International Conference on Robotics and Automation. Website: coperception.github.io/double-m-quantification.
- **Sanbao Su**, Chen Zou, Weijiang Kong, Jie Han, and Weikang Qian, "A Novel Heuristic Search Approach for Two-level Approximate Logic Synthesis," in IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems.
- **Sanbao Su**, Yi Wu, and Weikang Qian, "Efficient Batch Statistical Error Estimation for IterativeMulti-level Approximate Logic Synthesis," in 55th Design Automation Conference, San Francisco, CA, USA, 2018.
- Songyang Han, **Sanbao Su**, Sihong He, Shuo Han, Haizhao Yang, Shaofeng Zou, and Fei Miao, "What is the Solution for State-Adversarial Multi-Agent Reinforcement Learning?" published in Transactions on Machine Learning Research, 2024. Website: songyanghan.github.io/what_is_solution.
- Lei Zhou, Chunlei Cai, Yue Gao, **Sanbao Su**, and Junmin Wu, "Variational Autoencoder for Low Bit-rate Image Compression," in the IEEE / CVF Computer Vision and Pattern Recognition Workshops, 2018.