Sanbao Su

University of Connecticut, Storrs, CT,
susanbaonju@gmail.com (959) 929-9265

QUALIFICATIONS

- Several publications at conferences and journals, including ICRA, CVPR, DAC
- Strong object oriented programming experience: 8 years of C++ experience, 4 years of Python experience
- Skilled at PyTorch, Tensorflow, C++ library (STL) and data structures
- Strong knowledge of theory, practice, and research experience on autonomous vehicles, Computer Vision
- 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
- Collaboration skills, project development experience with 50+ people and managed a team of 15 programmers

EDUCATION

Ph.D. Student, Machine Learning, Department of Computer Science and Engineering 09/2021 - Present
University of Connecticut, Storrs, CT GPA: 4.00/4.00
Research field: Uncertainty Quantification, Perception, Reinforcement Learning, Autonomous Vehicles

M.A., Electronic Science and Technology, 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
Related courses: Algorithms, Operating Systems, Machine Learning, Computer Vision, Data Structures, Stochastic Process, Reinforcement Learning, C++ Programming Language, Object Oriented Programming

RESEARCH EXPERIENCE

Research Assistant University of Connecticut, Storrs, CT, 09/2021 - Present

- Designed the framework to quantify the uncertainty of collaborative object detection and propagate the uncertainty to multiple object tracking in order to demonstrate the importance of uncertainty quantification in both object detection and tracking of autonomous driving. Outcomes: We are the first ones to do it. Experimental results showed our algorithm achieves a 2% improvement in accuracy and a 2.67X reduction in uncertainty. The paper has been submitted to IEEE Robotics and Automation Letters.
- Designed 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. Outcomes: We are the first ones to do it. Experimental results showed our algorithm achieves more than 4× improvement on 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
- Attended to design a stable and efficient reward reallocation algorithm to efficiently reallocate the system's total reward to motivate stable cooperation among autonomous vehicles. In experiments, compared with several literature algorithms, we show the improvement of CAV systems' mean episode system reward using our proposed algorithm. The paper was accepted by ICRA 2022

Research Assistant UM-SJTU Joint Institute, Shanghai, China, 09/2016 - 03/2019

- Designed algorithms and did experiments with C++ for two projects on approximate logic synthesis. Published three papers for these two projects in the top conference and journals.

WORK EXPERIENCE

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

- Conduct the project "active testing on perception" at the CR-RHI1 group in the Bosch Research Center
- Active testing carefully selects the test points to label, ensuring sample-efficient model evaluation

- Develop a Vision Transform-based active testing framework that provides computational efficiency, flexibility for tasks such as object detection and segmentation, and adaptability to varying levels of sample complexity
- Outcome: Compared to baselines, achieve 6X improvement, achieve a loss approximation within 0.66% error with 8% image-level labels. obtain a loss approximation within 2.2% error with just 0.1% region-level labels. Plan to submit to CVPR 2024.

Full-time Software Engineer Shanghai Huawei Technologies Company, Shanghai, China, 04/2019 - 08/2021

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

- Wrote C++ 32.5KLoc, wrote 600+ test cases, 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 other team members for half a year, found functional problems, code style problems, and test cases design problems
- 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
- Passed the C++ Professional Software Proficiency Exam in Huawei which is designed for senior software engineers, skilled in C++ and C++ STL, and familiar with Design Patterns

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
- Weekly tested the software version on real autonomous vehicles (road test), found problems and reported
- Familiar with ROS and rule-based behavior decision algorithms

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
- Applied and tested different model acceleration technologies on the post-processing architecture, such as MobileNet V1/V2, and Neural Network Quantization, finally reduced up to 50.3% running time with slight performance loss
- Submitted our work to the 2018 CVPR Challenge on Learned Image Compression and gained the comprehensive first prize

SELECTED PUBLICATIONS

- Sanbao Su, Songyang Han, Yiming Li, Zhili Zhang, Chen Feng, Caiwen Ding, Fei Miao, “Collaborative Multi-Object Tracking with Conformal Uncertainty Propagation”, submitted to IEEE Robotics and Automation Letters, under review.
- Sanbao Su, Yiming Li, Sihong He, Songyang Han, Chen Feng, Caiwen Ding, and Fei Miao, "Uncertainty Quantification of Collaborative Detection for Self-Driving," accepted by the 2023 IEEE International Conference on Robotics and Automation. Website: https://coperception.github.io/double-m-quantification/
- Songyang Han, He Wang, Sanbao Su, Yuanyuan Shi, and Fei Miao, "Stable and Efficient Reward Reallocation for Cooperative Policy Learning of Connected Autonomous Vehicles," in 2022 IEEE International Conference on Robotics and Automation, Philadelphia, USA, 2022
- Sanbao Su, Chang Meng, Fan Yang, Junfeng Zhao, and Weikang Qian, "VECBEE: A Versatile Efficiency-Accuracy Configurable Batch Error Estimation Method for Greedy Approximate Logic Synthesis," in IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems

- 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.
- Lei Zhou, Chunlei Cai, Yue Gao, Sanbao Su, and Junmin Wu, "Variational Autoencoder for Low Bit-rate Image Compression," in the IEEE Conference on Computer Vision and Pattern Recognition Workshops, 2018.