Site Bai

My research interests focus on Deep Reinforcement Learning, Robotic Grasping, Computer Vision and Motion Planning.

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Education

- **Xi'an Jiaotong University (XJTU), Qian Xuesen College** — Xi'an, China
  Bachelor of Engineering in Computer Science (Honors Science Program) — *Sep. 2016 – Jun. 2020*
- **University of California, Berkeley** — Berkeley, USA
  International Study Program — *Aug. 2018 – Dec. 2018*
- **National University of Singapore** — Singapore
  Summer Workshop — *Jul. 2018 – Aug. 2018*
- **Xi'an Jiaotong University** — Xi'an, China
  Special Class for the Gifted Young / Honors Youth Program — *Sep. 2014 – Sep. 2016*

Publication

Preprint

- **Hindsight Trust Region Policy Optimization**
  arXiv preprint arXiv:1907.12439
  - **Authors**: Hanbo Zhang*, **Site Bai***, Xuguang Lan, Nanning Zheng
  - **Content**: Put forward a reinforcement learning method introducing hindsight methodology to TRPO; Achieved high data-efficiency in sparse reward environments and maintained learning stability by restricting variance during the policy update process.

Published

- **ROI-based Robotic Grasp Detection for Object Overlapping Scenes**
  2019 IEEE/RSJ International Conference on Intelligent Robots and Systems ***(IROS 2019)***
  - **Authors**: Hanbo Zhang, Xuguang Lan, **Site Bai**, Xinwen Zhou, Zhiqiang Tian, Nanning Zheng
  - **Content**: Proposed a robotic grasp detection algorithm called ROI-GD based on Region of Interest(ROI); Achieved successful robotic grasps at the rates of 92.5% and 83.8% in single-object and multi-object scenes respectively.

- **A Multi-task Convolutional Neural Network for Autonomous Robotic Grasping in Object Stacking Scenes**
  2019 IEEE/RSJ International Conference on Intelligent Robots and Systems ***(IROS 2019)***
  - **Authors**: Hanbo Zhang, Xuguang Lan, **Site Bai**, Lipeng Wan, Chenjie Yang, Nanning Zheng
  - **Content**: Proposed a multi-task convolutional neural network integrating vision-based robotic grasp detection and visual manipulation relationship reasoning together; Realized successful autonomous grasps with a success rate of 90.6%, 71.9% and 59.4% in object cluttered scenes, familiar stacking scenes and complex stacking scenes respectively.

Research and Project

- **Institute of Artificial Intelligence and Robotics | Research Intern** — Xi'an Jiaotong University
  Supervisor: Prof. Xuguang Lan and Prof. Nanning Zheng — *Dec. 2017 - Present*
  - **Hindsight Trust Region Policy Optimization**: Derived functions involved in the optimization problem of Hindsight TRPO; Completed all the experiments of baseline algorithms including Hindsight Policy Gradient, Hindsight Experience Replay and Trust Region Policy Optimization; Played with many deep reinforcement learning algorithms along the way, including mainstream valued-based algorithms like Deuling DQN, Rainbow, etc. and policy-based algorithms including Guided Policy Search(GPS), Generative Advantage Estimation(GAE), etc.
  - **ROI-based Robotic Grasp Detection**: Labeled more than 600 images including the object instances, manipulation relationships, contributing to a multi-object grasping dataset; Learned several grasping algorithms including Hand-eye coordination for robotic grasping and Visuomotor Controller for Grasping; Implemented Baxter robot interface using ROS.

- **Robotic Grasping System for Object Stacking Scenes**: Debugged the programs for grasping experiments; Fine-tunned the parameters of the algorithm; Collated part of the paper.
- **Watercraft Detection**: Played with mainstream detection algorithms including R-CNN series, SSD and YOLO series; Achieved the highest accuracy of 90.4% with faster-RCNN.
- **Other Contribution**: Visual Manipulation Relationship Dataset.

- **School of Computing Summer Workshop | Participant** National University of Singapore
  Supervisor: Prof. Ng Teck Khim *Jul. 2018 - Aug. 2018*
  - **Deep ConvNet Based Image Style Migration**: Achieved style migration on scenery photos and doodling images applying VGG-19; Learned Wavelet Transformation, Fast Fourier Transformation, edge detection filters, denoising, etc., for image processing along the way; Demonstrated this project with a poster.

- **Institute of Computer Software and Theory | Research Intern** Xi'an Jiaotong University
  Supervisor: Prof. Heli Sun *Nov. 2017 - Jan. 2018*
  - **Trajectory Data Mining**: Reviewed Spatio-Temporal Reachable Regions Algorithm; Implemented it on massive taxi trajectory data in Shenzhen with Python.

Competition

- **National Undergraduate Mathematical Contest in Modeling | Contestant** China
  Supervisor: Dr. Lei Chen and Prof. Huanqin Li *Jul. 2017 - Sep. 2017*
  - **CT System Parameter Calibration and CT Image Construction**: Constructed a mathematical model to calibrate CT scanning angles; Used plane geometry to estimate the system initial value; Applied Filtered Back-projection algorithm to construct CT images; Award: National 2^{nd} Prize (top 3%).
  - **Contest Training Program**: Many other research done on various topics including Infectious Predicrtion, Housing Price Forecasting and Flight Timetable Scheduling during contest training program.

Professional Technique

- **Basic Programing Laguages:** Python, C/C++
- **Machine Learning Packages:** Pytorch, TensorFlow, scikit-learn
- **Robotic Developing Tools:** ROS, Gazebo, Arduino
- **Web Developing Tools:** HTML, Javascript, CSS
- **Database Managing:** JAVA, SQL
- **Text Editing:** LaTeX, Office, Markdown
- **Other Stuffs:** Photoshop, Premiere

Selected Scholarships & Honors

"Siyuan" Scholarship of Xi'an Jiaotong University *Oct. 2018*
National 2^{nd} Prize in Undergraduate Mathematical Contest in Modeling (top 3%) *Nov. 2017*
Outstanding Individual in Social Activities of XJTU *Oct. 2017*
"Siyuan" Scholarship of Xi'an Jiaotong University *Oct. 2017*
1^{st} Prize in XJTU English Translation Contest (top 5%) *Dec. 2016*

Language

Languages: Chinese (Native); English (Proficient); Korean (Limited)
TOEFL **Total:** 111. **Reading:** 30, **Listening:** 29, **Speaking:** 27, **Writing:** 25. *Feb. 24^{th} 2019*
GRE **Total:** 320+4.0. **Verbal:** 150, **Quantitative:** 170, **Analytical Writing:** 4.0. *Aug. 25^{th} 2017*

Hobby

Violin (Level 8); Singing (Solo and Chorus, 4 years of on-stage performing experience); Running; Reading; Movies