Site Bai

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My research interests include Machine Learning, Deep Reinforcement Learning, Robotics.

Education

- **Purdue University** — West Lafayette, USA
  Doctor of Philosophy in Computer Science — *Jan. 2021 – Dec. 2025 (Expected)*
- **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 ***Under Review in NeurIPS 2020***
  - **Authors**: Hanbo Zhang*, **Site Bai***, Xuguang Lan, David Hsu, Nanning Zheng
  - **Content**: Proposed a deep reinforcement learning method introducing hindsight methodology to TRPO to tackle the challenge of sparse reward in RL; Achieved high data-efficiency in sparse reward environments and restricted variance by proposing a Quadratic KL-divergence constraint.

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 grasp detection algorithm called ROI-GD by extracting features from Region of Interest(ROI); Achieved successful robotic grasps at the rates of 92.5% and 83.8% in single-object and multi-object scenes.

- **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.

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 - March. 2020*
  - **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(HPG), Hindsight Experience Replay(HER) and Trust Region Policy Optimization(TRPO); Played with many deep reinforcement learning algorithms along the way, including mainstream valued-based algorithms like Deuling DQN, etc. and policy-based algorithms including Natural Policy Gradient(NPG), Deep Deterministic Policy Gradient(DDPG), 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; 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.

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%).

Professional Technique

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

Selected Scholarships & Honors

"Siyuan" Scholarship of Xi'an Jiaotong University	*Oct. 2018*
National 3^{rd} Prize in National English Competition	*May. 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*

Courses

Introduction to Artificial Intelligence(Berkeley), Foundations of Optimization, Machine Learning, Computer Vision and Pattern Recognition, Natural Language Understanding and Machine Translation, Complex Network Dynamics, Numerical Analysis, Introduction to Database Systems(Berkeley), Mathematical Logic, Combinatorial Mathematics, etc.

Language

Languages: Chinese (Native); English (Proficient)

TOEFL	**Total:** 111. **Reading:** 30, **Listening:** 29, **Speaking:** 27, **Writing:** 25.	*Feb. 24^{th} 2019*
GRE	**Total:** 322+4.0. **Verbal:** 153, **Quantitative:** 169, **Analytical Writing:** 4.0.	*Oct. 20^{th} 2019*

Hobby

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