Chen **Gong**

Institute of Automation · Chinese Academy of Sciences · China

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Education

CUGB (China University Of Geosciences, Beijing)

Beijing, China

B.S. in Computer Science and Technology — *Sep. 2016 - Jun. 2020*

- GPA: 3.85/4.0
- Average score: 93.4/100.0
- Rank: 1/68
- Main courses: Higher Mathematics; College Physics; C++ Programming; Mathematics Modeling; Microcomputer Principle and Assembly Language; Discrete Mathematics and Formal Language; Linear Algebra; Programming Practices in Java; Data Structures; Computer Networks; Probability and Statistics; Object-Oriented Software Design; Computer Organization and Architecture; Algorithm Design and Analysis; Computer Graphics; Applications of Database Systems; Computer Network

CASIA (Institute of Automation, Chinese Academy of Sciences)

Beijing, China

M.S. in Pattern Recognition and Intelligent System — *Jun. 2020 - Now*

- GPA: 3.89/4.0
- Average score: 90.2/100.0
- Supervisor: Xinwen HOU, Yu LIU
- Main courses: Stochastic Processes; Pattern Recognition; Principle and Algorithms of Artificial Intelligence; Reinforcement Learning; Convex Analysis

Research Overview

My primary research interests include machine learning, reinforcement learning (RL), optimization, etc. Recently, my projects have focused on RL safety [1,2], developing theories on RL optimization [3, 4, 5, 6, 7], and machine learning in EEG signals [8, 9, 10].

Research Experiences

School of Computing and Information Systems, Singapore Management University

Singapore

Adversarial Policy Learning & Reinforcement Learning Safety — *Oct. 2021 - Now*

- Supervisor: David LO
- Under black-box settings, we proposed effective adversarial policies using a curiosity-driven and victim-aware RL-based method to attack agents in a two-player game. Our attack approach exploited the vulnerability of victims efficiently.
- In offline RL, the agents learn from a pre-selected and fixed dataset. We poisoned the offline dataset to insert a backdoor to the agent. We hoped that the agent normally performed if and only if it suffered from performance degradation fastly when the trigger was presented.
- One paper was submitted to ACSAC 2022 [2]; One paper was submitted to ASE 2022 [1]
- Key words: Adversarial policy; Backdoor attack; Data poisoning; Offline reinforcement learning

Institute of Automation, Chinese Academy of Sciences

Beijing, China

f-Divergence Reinforcement Learning — *Feb. 2021 - Oct. 2021*

- Supervisor: Xinwen HOU
- We developed a novel DRL framework: the policy evaluation and policy improvement phases were simultaneously performed by minimizing the f-divergence between the learning policy and sampling policy, which was distinct from conventional DRL algorithms aiming to maximize the expected cumulative results rewards.
- One paper was submitted to UAI 2022 [3].
- Key words: Reinforcement learning; f-divergence; Fenchel conjugate

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Beijing, China

Reinforcement Learning & Variational Inference — *Nov. 2019 - Dec .2020*

- Supervisor: Xinwen HOU
- We developed variational-based methods to stabilize the reinforcement learning training process through the constraint of the Bellman residual distribution between two adjacent time steps.
- Two papers were accepted as oral in ICONIP 2020 [7] and ICME 2021 [6], respectively; I completed the undergraduate thesis that was awarded the “Excellent Graduation Thesis”.
- Key words: Bellman residual distribution; Stationary random process; Stein variational gradient descent; Quantile regression

Tsinghua University, School of Medicine

Beijing, China

Medical Image Processing — *Jul. 2019 - Aug. 2019*

- Utilizing the Mask R-CNN algorithm, we segmented the coronary arteries of the heart in CTA images. We found that the appropriate image pre-processing and post-processing approach for CTA images would benefit the segmentation accuracy.
- Key words: Mask R-CNN, Image segmentation; Coronary arteries

China University of Geosciences, Beijing *Beijing, China*

Machine Learning in Medicine *Dec. 2017 - Feb. 2019*

- Supervisor: Yunyun NIU
- We designed the model that combined machine learning and feature extraction methods to classify intracranial EEG signals for the automatic diagnosis of epilepsy diseases.
- Three papers were accepted by *Applied Intelligence* [8], *Chinese Journal of Electronics* [9], *Computational Biology and Chemistry* [10], respectively.
- Key Words: Intracranial Electroencephalogram (iEEG), Epilepsy; Discrete wavelet transform, Parallel computing, Local simulated annealing, Probabilistic neural network

Publications

[1] **Chen Gong**, Zhou Yang, Yunpeng Bai, Junda He, Jieke Shi, Arunesh Sinha, Xinwen Hou, Xinwen Hou, Guoliang Fan, David Lo. Mind Your Data! Hiding Backdoor in Offline Reinforcement Learning Datasets. **Submitted** to Automated Software Engineering (ASE) 2022.

[2] **Chen Gong**, Zhou Yang, Yunpeng Bai, Jieke Shi, David Lo, Xinwen Hou, Arunesh Sinha, Bowen Xu, Guoliang Fan. Curiosity-Driven and Victim-Aware Adversarial Policies. **Submitted** to Annual Computer Security Applications Conference (ACSAC) 2022.

[3] **Chen Gong***, Qiang He*, Yunpeng Bai*, Zhou Yang, Xiaoyu Chen, Xinwen Hou, Xianjie Zhang, Yu Liu, Guoliang Fan. The f-Divergence Reinforcement Learning Framework. **Submitted** to Conference on Uncertainty in Artificial Intelligence (UAI) 2022. [Paper]

[4] Qiang He, Huangyuan Su, **Chen Gong**, Xinwen Hou. MEPG: A Minimalist Ensemble Policy Gradient Framework for Deep Reinforcement Learning. **Accepted** by Decision Awareness in Reinforcement Learning Workshop at ICML 2022. [Paper]

[5] Yunpeng Bai*, **Chen Gong***, Bin Zhang*, Guoliang Fan, Xinwen Hou, Yu Liu. Cooperative Multi-Agent Reinforcement Learning with Hypergraph Convolution. **Accepted** by International Joint Conference on Neural Network (IJCNN) 2022. (oral, 9 pages.) [Paper]

[6] **Chen Gong***, Qiang He*, Yunpeng Bai, Xinwen Hou, Guoliang Fan, Yu Liu. Wide-Sense Stationary Policy Optimization with Bellman Residual on Video Games[C]. 2021 IEEE International Conference on Multimedia and Expo (ICME). IEEE, 2021: 1-6. **Published**. (oral, 6 pages.) [Paper]

[7] **Chen Gong**, Yunpeng Bai, Xinwen Hou, Xiaohui Ji. Stable Training of Bellman Error in Reinforcement Learning [C]. International Conference on Neural Information Processing. Springer, Cham, 2020:439-448. **Published**. (oral, 10 pages.) [Paper]

[8] **Chen Gong**, Xinchen Zhou, Yunyun Niu. Pattern recognition of epilepsy using parallel probabilistic neural network[J]. Applied Intelligence, 2021: 1-12. **Published**. (IF=5.09, 12 pages.) [Paper]

[9] **Chen Gong**, Jiahui Liu, Yunyun Niu. Intracranial Epileptic Seizures Detection Based on an Optimized Neural Network Classifier[J]. Chinese Journal of Electronics, 2021, 30(3): 419-425. **Published**. (IF=1.01, 7 pages.) [Paper]

[10] **Chen Gong**, Xiaoxiong Zhang, Yunun Niu. Identification of epilepsy from intracranial EEG signals by using different neural network models[J]. Computational Biology and Chemistry, 2020, 87: 107310. **Published**. (IF=3.73, 10 pages.) [Paper]

Awards & Honors

Awards

2020	**Finalist,** the COMAP's Mathematical Contest in Modeling	*Beijing, China*
2019	**Meritorious Winner,** the COMAP's Mathematical Contest in Modeling	*Beijing, China*
2018	**Honorable Mention,** the COMAP's Mathematical Contest in Modeling	*Beijing, China*
2018	**First prize in Beijing,** Contemporary Undergraduate Mathematical Contest in Modeling	*Beijing, China*
2017	**First prize,** Mathematics Competition of China University of Geosciences	*Beijing, China*
2015	**First prize,** Hunan High School Mathematics Competition	*Hunan, China*

Honors

2021	**Merit Student,** University of Chinese Academy of Sciences	*Beijing, China*
2020	**Beijing Outstanding Graduates,** Beijing Municipal Education Commission	*Beijing, China*
2020	**School-level Excellent Graduation Thesis,** China University Of Geosciences , Beijing	*Beijing, China*
2017	**Outstanding Member,** China University Of Geosciences , Beijing	*Beijing, China*
2017	**National Scholarship for Undergraduates,** Ministry of Education of the people's Republic of China	*Beijing, China*

Skills, Certifications & Others

Languages: Chinese (Native) & English (CET6)

Skills: Python | C++ | Matlab | Linux | LaTex

Activities: Sharing my research notes in Zhihu website. Welcome to visit my Zhihu homepage: [Chen Gong's homepage].