

# Xuming Ran

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Google Scholar

ResearchGate

## RESEARCH EXPERIENCES

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### AI for Science

#### Shanghai AI Laboratory

Research Engineer (Full Time)

- AI for Visual Neuroscience
- Multi-Mask Auto-encoder for Structural Variants Detection

Mar, 2022 –Present

Shanghai, China

### Department of Biomedical Engineering

#### Southern University of Science and Technology(SUSTech)

Research Assistant (Full Time)

Advisor: Quanying Liu, Professor of SUSTech & Huihui Zhou, PI of Pengcheng Lab

- A computational framework to unify representation similarity and function in biological and artificial neural networks.
- Deep Generative Model for Out-of-distribution Detection

Jan, 2020 –Nov, 2021

Shenzhen, China

## EDUCATION

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### Department of Mathematics

#### Chongqing Jiaotong University

Bachelor of Science GPA: 3.06/5.00

Sep, 2017 –Jul, 2019 & Sep, 2020 –Jul, 2021

Chongqing, China

### Cold Spring Harbor Asia

#### Cold Spring Harbor Laboratory

AI and Brain Computation Summer School

Aug, 2021 –Sep, 2021

Suzhou, China

### Tsinghua Laboratory of Brain and Intelligence

#### Tsinghua University

CNeuro: Computational and Theoretical Neuroscience Summer School

Aug, 2019 –Sep, 2019

Beijing, China

## RESEARCH INTERESTS

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Generative model, Visual cortex computation, Memory modelling, Continual learning, AI for Science.

## PUBLICATIONS

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- **Xuming Ran**, Mingkun Xu, Lingrui Mei, Qi Xu, and Quanying Liu. “Detecting out-of-distribution samples via variational auto-encoder with reliable uncertainty estimation.” *Neural Networks* (2021).
- **Xuming Ran**, Mingkun Xu, Qi Xu, Huihui Zhou, and Quanying Liu. “Bigeminal Priors Variational auto-encoder.” arXiv preprint arXiv:2010.01819 (2020).
- **Xuming Ran**, Jie Zhang, Ziyuan Ye, Haiyan Wu, Qi Xu, Huihui Zhou, and Quanying Liu. “A computational framework to unify representation similarity and function in biological and artificial neural networks.” **Under Review** at: *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2022.
- **Xuming Ran**, et al, Self-supervised deep learning encodes multi-modalities features of genome sequence for detecting complex structural variants, **Submit to** at: *Nature Machine Intelligence*, 2023.
- Lingrui Mei, **Xuming Ran**, and Jin Hu. “Weakly Supervised Attention Inference Generative Adversarial Network for Text-to-Image.” In 2019 IEEE Symposium Series on Computational Intelligence (SSCI), 2019.

- Jie Yuan, **Xuming Ran**, Keyin Liu, Chen Yao, Yi Yao, Haiyan Wu, and Quanying Liu. “Machine Learning Applications on Neuroimaging for Diagnosis and Prognosis of Epilepsy: A Review.” *Journal of neuroscience methods* (2021).
- Li Ma, Renjun Shuai, **Xuming Ran**, Wenjia Liu, and Chao Ye. “Combining DC-GAN with ResNet for blood cell image classification.” *Medical biological engineering computing* 58, no. 6 (2020): 1251-1264.
- Qi Xu, Jiangrong Shen, **Xuming Ran**, Huajin Tang, Gang Pan, and Jian K. Liu. “Robust transcoding sensory information with neural spikes.” *IEEE Transactions on Neural Networks and Learning Systems* (2021).
- Shan-Shan Li, Yu-Shi Jiang, Xue-Ling Luo, **Xuming Ran**, Yuqiang Li, Dong Wu, Cheng-Xue Pan, Peng-Ju Xia, Photocatalytic Vinyl Radical-Mediated Multicomponent 1,4-/1,8-carboimination Across Alkynes and Olefins/(Hetero)Arenes, *Science China Chemistry*, 2023.
- Qi Xu, Yuyuan Gao, Jiangrong Shen, Yaxin Li, **Xuming Ran**, Huajin Tang, Gang Pan, Enhancing Adaptive History Reserving by Spiking Convolutional Block Attention Module in Recurrent Neural Networks, *NeurIPS*, 2023.
- Hong Peng, Mingkun Xu Bo Wang, Zheyu Yang, **Xuming Ran**, Bo Li, Jiaohua Huo, Jing Pei, Yuanyuan Cui , Huafeng Xiao, Xin Lou, Cuiqing Mao, Guangming Zhu, Liang zhang , Zheng You, Lin Ma, A New Virtual MR Contrast - enhancement Method based on Deep Learning: Faster, Safer, and Easier, **Under Review** at: *Nature Machine Intelligence*, 2022.
- Tingting Jiang, Qi Xu, **Xuming Ran**, Jiangrong Shen, Pan Lv, Qiang Zhang, Gang Pan, Adaptive deep spiking neural network with global-local learning via balanced excitatory and inhibitory mechanism,**Under Review** at: *ICLR*, 2023.
- Mengyu Yang, Ye Tian, Rui Su, **Xuming Ran**, ViMoV2: Efficient Recognition for Long-untrimmed Videos with Multi-modalities,**Under Review** at: *AAAI*, 2023.
- Qi Xu, Sibao Liu, **Xuming Ran**, Yaxin Li, Jiangrong Shen, Huajin Tang, Jian K. Liu, and Gang Pan, Robust Sensory Information Reconstruction and Classification with Augmented Spikes,**Under Review** at: *IEEE Transactions on Neural Networks and Learning Systems*, 2023.
- Songming Zhang, Xiaofeng Chen, **Xuming Ran**, Zhongshan Li, Wenming Cao, Even decision tree needs causality,**Under Review** at: *IEEE Transactions on Neural Networks and Learning Systems*, 2022.

## SELECTED PROJECTS AND COMPETITIONS

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### 2020 Guangdong Academic Forum

Jul, 2020 –Aug, 2020

–*Biomedical Engineering Brain Science Symposium*

Southern University of Science and Technology

- I propose a new framework that utilizes an over-parameterized auto-encoder with V4 neural representation as inputs and the third convolutional layer (Conv3) of AlexNet as the latent code, and then feedforward to the following layers of AlexNet to decode the category of images seen by monkey. Our method allows to reciprocally map of neurons between the biological and the artificial neural network.
- Awarded third prize of abstract and prize money ¥600 CNY

### 2018 International Collegiate Competition on Brain-inspired Computing

Jul, 2018 –Oct, 2018

Tsinghua University

- Our team designed and implemented a high-dimensional cross-domain GAN, Weakly Supervised Attention Inference Generative Adversarial Network(WSAI-GAN), successfully visualized the human synesthesia phenomena, and achieved excellent results in some image cross- domain translation tasks.
- As the **only undergraduate** team to awarded third prize of final contest and prize ¥30,000 CNY

## PROFESSIONAL SERVICE

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**Conference Reviewing:**MICCAI; IJCNN; IEEE WCCI; FUZZ-IEEE, IEEE-CEC; ICONIP

**Journal Reviewing:** Pattern Recognition, Pattern Recognition Letters, Heliyon