Yingru Liu

Research Scientist in Meta Reality Lab.

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Research Interest

- Recurrent Neural Network, Probabilistic Graphical Models, Generative Models, Multi-task Learning

Education

Stony Brook University (SBU) **Stony Brook, NY, USA**
Phd. in Computer Engineering *Aug. 2015-May. 2021*
Thesis: Sequential Deep Generative Models for Stochastic Modeling of Multi-Variate Sequential data
GPA: 3.71/4.00

Univ. of Electronic Sci. and Tech. of China (UESTC) **Chengdu, China**
B.S. in Automation Engineering *Sep. 2011-Jun. 2015*
Thesis: Dynamic Modeling and Adaptive Neural Network Control of 3-D Position Mooring System
GPA: 3.88/4.00

Industrial Experience

Meta Platform Inc., New York, NY, USA **Jul. 2021 - Now**
Research Scientist, Meta Reality Lab (RL) - Input AI

- Empower next generation neural interface with advanced AL/ML research
- Conduct cutting-edge scientific and engineering solutions for interdisciplinary research projects between AI/ML and VR/AR, especially in interaction & input.

Facebook, Seattle, WA, USA **Jun. 2020 - Aug. 2020**
Software Engineer Intern, Machine Learning (PhD), Business Integrity

- Design and deploy advanced deep learning modules for web-page policy violation recognition.

Tencent AI Lab, Shenzhen, China **Jun. 2019 - Aug. 2019**
Research Summer Intern, Computer Vision

- Implemented SC-FEGAN for free-form facial editing and a GUI for user interaction.
- Cooperated with colleagues on model acceleration for pix2pixHD-based 2D Broadcaster Synthesis.

Academic Experience

Wireless and Networking Systems Lab, Stony Brook, NY, USA **Aug. 2015 - May. 2021**
Accurate, Scalable and Interpretable Deep Multi-task Learning

- Proposed a scalable and accurate model named Task Adaptive Activation Network (TAAN) for Multi-Task Learning on multiple computer vision problems.
- Designed two regularization methods to automatically discover relation of multiple domains.
- Proved that TAAN has better interpretability and analytical properties than other methods.
- Empirical Evaluation shows that TAAN consistently outperform state-of-the-art Multi-Task Learning models and has extremely lower model complexity in large scale applications.

Generalized Boltzmann Machine with Deep Neural Structures

- Proposed a flexible and efficient approach called Normalizing Flow - Restricted Boltzmann Machines (NF-RBMs) that scale Boltzmann machines to deeper representations.
- Implemented NF-RBMs by Tensorflow for density modeling and feature learning.
- Extended NF-RBMs for stochastic modeling on human motions and music streams.
- Our methods have up to 100% improvement than convetional RBMs in gray-scale image datasets.

Energy-based Recurrent Generative Model for Music Modeling

- Proposed an energy-based deep generative model called Chain-Graph Recurrent Neural Network (CGRNN) to efficiently and accurately model the dynamics of music, which is represented as MIDI or audio sound.
- Impremented state-of-art Recurrent Variational Autoencoders (STORN/VRNN/SRNN), Recurrent Boltzmann Machine (RNN-RBM) and baseline Autoregressive RNN by Tensorflow.
- Empirical Analysis demonstrates that the proposed model outperforms the state-of-the-art generative models on modeling high-dimensional multivariate music sequences. The performance improves up to 18%.

Brookhaven National Laboratory, Upton, NY, USA **Jan. 2020 - Apr. 2021**
Machine Learning for Improving Reliability of Physical Optics Simulations

- design machine learning algorithms to automatically control the physical optics simulations.

Center for Robotics at UESTC, Chengdu, China **Sep. 2013 - July 2015**
Adaptive Neural Network Control Design of a 3-D Position Mooring System

- Deducted the dynamic formulation of a 3-D positioon mooring system via Finite Element Method (FEM).
- Proposed a model-based robust and adaptive boundary controller by incorporating RBF Neural Nework.
- Proved of convergency of the proposed controller via Lyapunov's direct method.
- Conducted empirical evaluation on Matlab to demonstrate the control performance.

Adaptive Control of Offshore Ocean Thermal Energy Conversion System

- Developed an accurate dynamic modeling of an OTEC system via Hamilton's Principle.
- Proposed a model-based robust and adaptive boundary controller via Lyapunov's direct method.
- Conducted empirical evaluation on Matlab to demontrate the control performance.
- The proposed controller efficiently suppresses the vibration of OTEC system and fixes OTEC system to equilibrium position.

Skill

- Programming: Python, C/C++, Matlab
- ML Toolkits: Tensorflow, Pytorch, Scikit-Learn
- Online Platforms: Kubernetes, Github

Publications

Please refer to my [Google Scholar] or [Personal Website].