Ali Lotfi Rezaabad

Data Scientist · Deep Learning

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Education

The University of Texas at Austin, ECE Department — *Texas, USA*

Ph.D. Student in Deep Learning and Information Theory — *Aug. 2017 - PRESENT*

- deep learning, information theory, generative adversarial networks, variational auto-encoder, spiking neural networks,

Sharif University of Technology, EE Department — *Tehran, Iran*

M.Sc. in Electrical Engineering, Communication Systems — *Aug. 2014 - June 2016*

- optimization, millimeter wave cellular networks, wireless communication systems, cell planning,

Shahid Bahonar University of Technology, EE Department — *Kerman, Iran*

B.Sc. in Electrical Engineering, Communication Systems — *Aug. 2010 - June 2014*

- MIMO wireless communication, Space-Time Block Codes (STBC)

Skills

High-level languages	Python(Expert), MatLab(Expert), C++(Fluent)
Frameworks	Tensorflow, NumPy, MatPlotLib, SciPy, Keras, Scikit-learning
Algorithms	Support Vector Machine, ADAM Optimizer, Variational Auto-Encoders, MINE (Mutual Information Neural Estimation), Stochastic Gradient Descent, Gradient Descent, K-means clustering
Hardware description	Assembly

Graduate Coursework

Deep probabilistic modeling, **L**arge-scale optimization for machine learning, **C**ombinatorics & graph theory, **I**nformation theory, **S**tatistical models for big data, **P**robability & stochastic process, **D**eep learning seminar (Audited), **S**tochastic process, **A**dvanced communication systems, **A**daptive filters

Selected Projects

Face to Age — *Keras*

- Yearbook dataset was used to train AlexNet and Image Net
- Different loss functions (i.e. regression loss function (RMS), and cross entropy loss) with various regularizer has been tested to check their cons and pros (codes are available on my github repository)

Large scale online learning — *Python*

- Randomized high dimension-large dataset generated to train model online for classification (a.k.a online learning)
- Gauss-Newton algorithm with Jacobian approximation (offline learning) are implemented for comparison
- Implementing large scale online learning algorithm (link) for classification (code is available on my github repository)

Variational information bottleneck via deep neural network — *Tensorflow, Python*

- MNIST and CIFAR 10 have been used to do classification task
- A very dense fully connected deep neural network has been implemented
- Given this over parameterized network, overfitting is a major problem. We provide an information-theoretic regularizer to help the network to prevent overfitting
- The same strategy has been used for convolutional neural network for CIFAR-10 classification
- Also ADAM algorithm has been used for optimization task

Generative Networks — *Tensorflow, Python*

- Implementation of auto-encoding variational Bayes
- MNIST has been used to encode it to lower entropy distributions
- Given lower entropy representation of MNIST data set, a decoder has been trained to generate disentangled new images
- Implementing generative adversarial network (GAN) and Wasserstein GAN (WGAN) as implicit generative networks

A Method for Stochastic Optimization (ADAM Optimizer) — *Python*

- Implementation of ADAM (ADAptive Moment estimation) for large scale convex and non-convex optimizations

Q-learning scheduling for wireless networks *MatLab*

- Proposing a new method for device-to-device wireless resource allocation for LTE networks based on multi agent reinforcement learning
- To make the method more stable different reward functions has been tested

Image Classification *Tensorflow, Python*

- Implementation of convolutional neural network to classify CIFAR-10 data set
- Dropout and pooling have been used to prevent from overfitting

5G cell planning framework *MatLab*

- I proposed a cost-effective framework for the planning of the next generation of cellular networks (5G)
- The major point of this project is that it has the feature to leverage already installed equipments (like base stations, fiber) to effectively reduce the expenditures
- the results have been published in IEEE transaction on vehicular technology

Experiences

The University of Texas at Austin *Texas, USA*

Research Assistant *Aug. 2017 - PRESENT*

- Ongoing work on the intersection of information theory and Generative Adversarial Networks (GANs) and Variational Auto-Encoder (VAE) which helps to understand the functionality of deep generative networks
- Proposing a new information-theoretic regularizer for deep neural networks
- Ongoing work on the training of spiking neural networks
- Ongoing work on development of spiking reinforcement learning and its applications

Sharif University of Technology *Tehran, Iran*

Research Assistant *Aug. 2014 - June 2017*

- Reinforcement learning applications to 5G wireless communications
- Proposed a framework for 5G wireless network infrastructure planning (the results are published on IEEE transaction of vehicular technology)

The University of Texas at Austin *Texas, USA*

Teaching Assistant *Aug. 2017- June 2018*

- Probability and stochastic process
- Linear systems design & analysis

Publications

Ali Lotfi Rezaabad, and Sriram Vishwanath, "PALISADE: Long Short-Term Memory Spiking Networks and Their Applications", *Submitted to International Conference on Machine Learning (ICML) 2019*.

Ali Lotfi Rezaabad, H. Beyranvand, J. A. Salehi, and M. Maier, "Ultra-Dense 5G Small Cell Deployment for Fiber and Wireless Backhaul-Aware Infrastructures", *in IEEE Transactions on Vehicular Technology*, vol. 67, no. 12, pp. 12231-12243, Dec. 2018.

Ali Lotfi Rezaabad, S. Talebi and A. Chizari, "Two quasi orthogonal space-time block codes with better performance and low complexity decoder," *2016 10th International Symposium on Communication Systems, Networks and Digital Signal Processing (CSNDSP)*, Prague, 2016, pp. 1-5.

V. AmiriKooshki, M. A. SadatHosseini, **Ali Lotfi Rezaabad** and S. Talebi, "Performance enhancement of the Golden code by utilizing the ORIOL antenna," *2016 8th International Symposium on Telecommunications (IST)*, Tehran, 2016, pp. 288-292.

Honors

2016 **Honored Alumnus,** Class of 2016, Sharif University of Technology *Tehran, Iran*

2014 **Ranked 5th,** among more than **42000** participators in M.Sc National Entrance University Exam *Iran*

2014 **Ranked 1st,** among **120** students, class of 2010, Shahid Bahonar University of Kerman *Kerman, Iran*