Luoluo Liu

Data Scientist, Philips Research North America, Cambridge, MA, USA.
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PROFESSIONAL SUMMARY

Specialized in Machine learning and deep learning, Artificial Intelligence for applications such as classification, regression, object detection, time-series and other applications in the field of signal processing. Proficient using Python, MATLAB to develop prototypes and practical solutions. Extensive experience in health-care industry in 3 healthcare companies with 3+ years experience. Capable of working independently as well as with teams. 4 patent application, 8 invention disclosures and 4 grant proposals.

EDUCATION

Johns Hopkins University, Baltimore, MD, USA *December 2019*
Ph. D. in Electrical and Computer Engineering (**Machine Learning**);
M. S. E. in Applied Math and Statistics (**Statistics and Optimization)** *May 2019*
M. S. E. in Electrical and Computer Engineering *December 2014*
GPA: 3.92/4.00

Xinan Jiaotong University, China *June 2013*
B.S. in Electrical Engineering
GPA: 91.8/100, Rank: 1/425, Outstanding Graduate (2013)
National Scholarship , Ministry of Education of the P.R. China (Top 0.7%)

COMPUTER SKILLS

- Expertise in Python, MATLAB, R for modeling, simulation, and developing optimization algorithms; data processing and visualization.
- Proficient in Pandas, Numpy, Scikit-learn, Matplotlib,
- Proficient in PyTorch, Keras, TensorFlow
- Experienced with Pyspark, SQL
- Experienced with Bash script for jobs management in school-owned cluster and AWS
- Experienced with SVN, Git
- Word and LaTeXfor technical writing; Powerpoint for presentations

WORK EXPERIENCE

Philips Research North America, Cambridge, MA Jan 2020 - present
Data Scientist

- Analytic and predictive modelling for Philips Patient Flow Capacity Suite (PFCS)
- Publishing works on Interpretable top comorbidities of recurrent patients and readmission risk
- Time-series modelling for clinical decision support using EMR, physiological signals and continuous monitoring (respiratory waveform, ECG,PPG, Capnography, breath sound and heart sound) data
- Writing invention disclosures and grants applications

Selux Diagnostics, Boston, MA May 2019 - Dec 2019
Algorithm Intern, Algorithm Engineer

- Addressing data imbalance and reference noise issues in large-scale machine learning problem
- Developing machine learning in production code (using ETL code and interact with SQL database)

Siemens Healthineers, Princeton, NJ May - August 2018
Deep Learning Research Intern

- Developed 2-dimensional and 3-dimensional(3D) Neural Networks for quality assessment of volumetric MR images
- Built a 3D motion simulation on volumetric and 3D MR images to generate training data for deep learning
- Use adversarial training for domain adaptation using Generative Adversarial Networks with team

Johns Hopkins University, Baltimore, MD September 2013 - December 2019
Research Assistant (with Prof. Trac Tran and Prof. Peter Chin)

- Proposed a framework to improve generalization of neural network to be able to perform images classification using VGG network as well as object detection using Faster R-CNN with arbitrary partial observation ratios
- Employed sparse Dictionary Learning to Thalamus Segmentation from MRI images for automatic segmentation, even on cases that is challenging for human to delineate the thalamus
- Created a novel alternative improved method to sparse recovery: a collaborative scheme from multiple bootstrapping samples to improve the performance of regression and studied the theoretical properties
- Improved the conventional Bagging in sparse regression by reducing the bootstrap ratio and proved the trick theoretically
- Developed an efficient Partial Face Recognition algorithm using Dictionary Learning approach to test on partial image patches without retraining
- Developed the reconstruction algorithm of Random Replicate Mirror Imaging System to perform system calibration and recovery of the scene pictures
- Proposed a novel and robust blind watermarking scheme based on wavelet tree
- Solved the Interference Alignment for MIMO wireless communication problem numerically

Teaching Assistant September 2014 - May 2018

- Courses: Compressed Sensing & Sparse Recovery; Wavelets & Filter Banks; Intro. to ECE
- Worked with non-experts; Conveyed complicated ideas in simple ways; Coordinated with other TAs and the lab manager

PUBLICATIONS

• **Operational Research**:

LuoLuo Liu, Dennis Swearingen, Eran Simhon, Chaitanya Kulkarni, David Noren, Ronny Mans, "Interpretable Identification of Comorbidities Associated with Recurrent ED and Inpatient Visits," *to appear in EMBC 2022*
Eran Sinhom, **LuoLuo Liu** "Improvements of readmission risk score," *talk in AMIA, CIC*

• **Ensemble Methods on sparsity optimization**:

LuoLuo Liu, Sang P. Chin, Trac D. Tran, "JOBS: Joint-Sparse Optimization from Bootstrap Samples," https://arxiv.org/abs/1810.03743, *arxiv, submitted to Information Theory* pdf
LuoLuo Liu, Sang P. Chin, Trac D. Tran, "JOBS: Joint-Sparse Optimization from Bootstrap Samples," *IEEE International Symposium on Information Theory (ISIT),2019*
LuoLuo Liu, Sang P. Chin, Trac D. Tran, "Reducing Sampling Ratios and Increasing Number of Estimates Improve Bagging in Sparse Regression, "*Accepted at 53rd Annual Conference on Information Science and Systems (CISS),2019* **[invited paper]** pdf

• **Image Processing and computer vision (natural, medical, OCT images)**:

Gouthamaan Manimaran, Urmila Airsang, Soumabha Bhowmick, Abhijith Girin, **Luoluo Liu**, Carol Lane, Dheepak S, Celine Firtion, Pallavi Vajinepalli, Kumar T. Rajamani, "Evaluation Tool to Diagnose Faults and Discrepancy in Semi-Automated or Manual Annotations in Ultrasound Cine Loops (Videos) ," *to appear in EMBC 2022*

Jasper R. Stroud, **Luoluo Liu**, Sang P. Chin, Trac D. Tran, Mark A. Foster, "High speed optical coherence tomography using real time compression to achieve 72 MHz A-scan rates," *Optical Express, 2020*

Arun Nair*, **LuoLuo Liu***,Akshay Rangamani, Sang P. Chin, Muyinatu A L. Bell, Trac D. Tran, "Reconstruction-free Deep Convolutional Neural Networks for Partially Observed Images," *GlobalSip 2018* (Joint first authors) ppt, pdf

Silvia Arroyo-Camejo, Benjamin Odry, Xiao Chen, Kambiz Nael, **LuoLuo Liu**, David Grodzki, Mariappan S. Nadar, "Towards Contrast-Independent Automated Motion Detection Using 2D Adversarial DenseNets," *International Society for Magnetic Resonance in Medicine(ISMRM 2019)*

LuoLuo Liu, Xiao Chen, Silvia Bettina Arroyo Camejo, Benjamin L. Odry, Mariappan S. Nadar, "Motion Determination for Volumetric Magnetic Resonance Imaging using a Deep Machine-learning Model," *US Patent*

LuoLuo Liu, "Jeffrey Glaister, Xiaoxia Sun, Aaron Carass, Trac D. Tran, Jerry L. Prince, Segmentation of Thalamus from MR Images via Task- Driven Dictionary Learning ," *SPIE medical Imaging 2016* pdf

LuoLuo Liu, Trac D. Tran, Sang P. Chin, "Partial Face Recognition: A Sparse Representation-based Approach," *IEEE Conf. on Acoustics, Speech and Signal Processing(ICASSP), 2016* pdf

Dung N. Tran*, **LuoLuo Liu***, Trac D. Tran, Sang P. Chin, Jeffery Korn, Eric T. Hoke, "Compressive Coding via Random Replicate Mirror," *GlobalSip 2016* (Joint first authors) pdf