

# LIANGQUN LU

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## WORK EXPERIENCES

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### Deep Learning Engineer Summer Intern

NLP group, Gyr Falcon Technology Inc.

May – July 2019

Milpitas, CA

My responsibilities at NLP group included various data collection for specific application problems, trained and deployed deep learning models. I also built a demo for on-chip video classification.

- Be trained with Software Development Kit (SDK) and Model Development Kit (MDK) to implement deep learning model deployment on AI accelerator ASIC chips. I wrote a detailed TensorFlow MDK user experience potentially helpful for other employees.
- Learned Compact Descriptors for Video Analysis (CDVA) and applied the company patented CDVA method and widely used pre-trained CNN models for video analysis. I used TensorFlow to train quantized deep learning models for human action recognition using public datasets, interpreted the results and built a demo for presentation using on-chip AI accelerator.
- Used JavaScript to widely collect images and videos for traffic cars, roads and human activities for deep learning model training and application on surveillance security.
- Explored biomedical images and diagnosis text for potential deep learning model training and application on healthcare.
- Collected Dash Cam videos for potential self-driving applications.

### Data Science Summer Intern – ORISE Fellow

US Food and Drug Administration

June – August 2018

Silver Spring, MD

My responsibilities included the exploring Generative Adversarial Networks(GANs) approaches for Electrocardiograms(ECGs) generation in order to investigate Atrial fibrillation(AF) arrhythmia for potential diagnosis purposes. This project was collaborated with Division of Applied Mechanics and I presented weekly progress.

- Learned the features of ECGs and Atrial fibrillation(AF) arrhythmia and the disease profile.
- Used TensorFlow and Keras to build deep convolutional GAN model architectures. I tuned the parameters including learning rates, numbers of nodes and layers, optimization methods for properly visual ECG signal generation.
- Converted the 1 dimensional ECG signal segment into Spectrogram and Frequency images using Inverse Fourier Transform. I used DCGAN to generate both images, then converted into the signals. I furthermore used Matlab ECGPUWAVE toolkit to predict features for generated ECG signals and evaluate the GAN approach.
- Presented a review of GAN variants and explored other GAN methods for ECG generation including Wasserstein GAN, Energy based GAN, Boundary Equilibrium GAN.
- Finished a poster to summarize the summer work, including Background, Regulatory Relevance, Objectives, Datasets and Workflow, GAN Training Processes, Visual generated ECG signals, Evaluation and Fiducial Point Distributions.

### Software Engineer Summer Intern

Institute for Intelligent Systems, University of Memphis

June – August 2017

Memphis, TN

My responsibilities included the CohMetrix webtool update for the previous CohMetrix project where the online webtool was extremely slow to support over access given the old server. I rewrote the webtool page using Model-View-Controller(MVC) at C# to Finish the calculation on server and return results to users on the webpage.

- Learned the web development using Model View Controller architectures and proposed a MVC based web page update to fix the overload problems
- Used .NET MVC at C to build a new interface for CohMetrix webtool (<http://tool.cohmetrix.com/>) where the user text submission was received, calculated and returned under the Controller control. The CohMetrix was loaded to calculate the analysis for the user text using Socket IP connection.
- Added the recaptchas to preprocess and verify the input texts before the submission was passed to server calculation. The online tool was improved significantly.

### **Bioinformatics Engineer**

**July 2013 – July 2014**

Department of Computational Biology, Beijing Computing Center

Beijing, China

My responsibilities included RNA-seq analysis from Next-Generation Sequencing (NGS), RNA-seq analysis pipeline maintenance and customer service. The RNA-seq analysis ran on the High-Performance Clusters. I finished RNA-seq analysis on projects of rice, cows and pigs for customers. I also instructed RNA-seq analysis in Bioinformatics workshop from the Department.

## **EDUCATION**

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### **Doctor of Philosophy**

**August 2016 – December 2019**

University of Memphis

Memphis, TN

Dissertation title: Machine Learning Approaches for Disease Classification Using Genome Scale Datasets and Biomedical Images.

### **Master of Science**

**August 2017 – May 2019**

University of Memphis

Memphis, TN

Project title: End-To-End Adversarial Learning for Conversational Generation Using Pre-Trained Word Embeddings.

### **Master of Science**

**August 2014– June 2016**

University of Hawaii at Manoa

Honolulu, HI

Thesis title: Multi-Omic Data Integration to Stratify Population in Hepatocellular Carcinoma(HCC).

### **Master of Science**

**September 2010 – June 2013**

China Agricultural University

Beijing, China

Thesis title: Functional Database Construction for Carbohydrate-Active Enzymes.

### **Bachelor of Science: Biological Sciences**

**September 2006 – June 2010**

China Agricultural University

Beijing, China

## **PUBLICATIONS**

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### **Manuscripts in preparation**

1. Liangqun Lu, Bernie Daigle, Jr. Clinical Subgroup-Specific PTSD Classification and Biomarker Discovery
2. Liangqun Lu, Bernie Daigle, Jr. Multi-omic data integration to discover subgroups of PTSD

### **Peer reviewed journal articles**

1. **Liangqun Lu \***, Bernie Daigle, Jr. Prognostic Analysis of Histopathological Images Using Pre-Trained Convolutional Networks, BMC Bioinformatics (Under Review)

2. **Liangqun Lu \***, Kevin Townsend, Bernie Daigle, Jr. GEOLimma: Feature Selection For Gene Expression Data Using Large-Scale Microarray Data, BMC Bioinformatics (Under Review)
3. Chaudhary Kumardeep \*, Olivier B. Poirion \*, **Liangqun Lu**, Sijia Huang, Travers Ching, and Lana X. Garmire. 2018. Multi-Modal Meta-Analysis of 1494 Hepatocellular Carcinoma Samples Reveals Significant Impact of Consensus Driver Genes on Phenotypes. Clinical Cancer Research: An Official Journal of the American Association for Cancer Research, September.
4. Chaudhary Kumardeep \*, Olivier B. Poirion \*, **Liangqun Lu**, and Lana X. Garmire. 2017. Deep Learning Based Multi-Omics Integration Robustly Predicts Survival in Liver Cancer. Clinical Cancer Research: An Official Journal of the American Association for Cancer Research, January. American Association for Cancer Research, clincanres.0853.2017.
5. **Liangqun Lu \***, Sara McCurdy \*, Sijia Huang, Xun Zhu, Karolina Peplowska, Maarit Tiirikainen, William A. Boisvert, and Lana X. Garmire. 2016. Time Series miRNA-mRNA Integrated Analysis Reveals Critical miRNAs and Targets in Macrophage Polarization. Scientific Reports 6 (December): 37446.

#### Conference abstracts/posters

1. Multi-Omic Data Integration to Discover Subgroups of PTSD Using Deep Denoising Autoencoder. Big Data in Precision Health 2019, Stanford, CA, May 22 - 23, 2019
2. Prognostic Analysis of Histopathological Images Using Pre-Trained Convolutional Networks, Birmingham, AL, March 28 - 30, 2019
3. Generating ECG signals with Generative Adversarial Networks, Silver Spring, MD, August 01, 2018
4. Clinical Subgroup-Specific PTSD Classification and Biomarker Identification. Big Data in Precision Health 2018, Stanford, CA, May 23 - 24, 2018
5. Large-scale Microarray Data Based Feature Selection For Improved Molecular Classification. 16th annual UT-KBRIN Bioinformatics Summit 2017, Burns, TN, April 21-23, 2017
6. Association analysis of driver genes of hepatocellular carcinoma with cancer hallmarks. 13th Rocky Mountain Bioinformatics Conference, Aspen, CO, Dec.10-13, 2015
7. Integrative analysis of RNA-seq and miRNA-seq revealed functional miRNAs in the macrophage. Jabsom Symposium, Honolulu, HI, Apr. 15, 2015