

Luchao Qi

Research Data Scientist



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EDUCATION

The Johns Hopkins University May 2020
M.Sc.Eng. Biomedical Engineering 3.7/4.0
Northeastern University Aug 2018
B.Eng. Biomedical Engineering 3.9/4.0

SKILLS

Programming: Python, R, SQL, Batch Scripting
Packages: NumPy, Pandas, Scikit-Learn, NLTK, Keras, PyTorch
Machine Learning: GLM, Random Forest, SVM, PCA, CNN, LSTM
Data Visualization: Tableau, Matplotlib, Seaborn, ggplot2, plotly
Data Science: A/B testing, Hadoop

WORK EXPERIENCE

Research Assistant, The Johns Hopkins Data Science Lab

Baltimore, MD | Sep 2019 - Present

Association analysis between lifestyle patterns and body mass index (BMI) via generalized linear model

- Wrangle time-series data of 32971 subjects and build pipeline to front-end dashboard using **SQL**
- Explore user distribution on **Hadoop** using **MapReduce** to maximize the dataset's value
- Train a generalized linear model (**GLM**) to predict user BMI with 46.07 mean squared error (MSE)
- Reduce prediction error by 13% using **ANOVA** and feature engineering method (**normalization, Random Forest**) through 10-fold cross validation
- Identify statistically significant (p-value < 0.5) impact of lifestyle patterns on BMI to encourage the performance of multiple good health behaviors

Data Analyst Intern, The Johns Hopkins Bloomberg School of Public Health

Baltimore, MD | May 2019 – Aug 2019

Survival analysis of time-series data using Python, R

- Cleaned National Health and Nutrition Examination Survey (NHANES) data using **dplyr, tidyverse**
- Reduced dimensionality of data using **PCA** to capture essence of the data
- Selected features using **tree-based model, AIC/BIC** to achieve better predictive performance of model
- Constructed a spectral-based convolutional neural network (**CNN**) on 3000 patients using **Keras** to predict mortality with 71% accuracy
- Improved mortality prediction accuracy to 86.45% using **regularized logistic regression**
- Hosted R shiny website comparing **PCA, k-means, UMAP, t-SNE** and visualizing clustering results using **ggplot2, plotly** (demo: https://luchaoqi.github.io/Shiny_clustering/#1)

Senior Researcher, Paul C. Lauterbur Lab at SIAT

Shenzhen, CN | Nov 2016 - Jan 2017

EMG signal pattern recognition for hand gestures using spectral analysis

- Designed, constructed and assembled EMG data acquisition system for arm activities recognition
- Converted time-domain data of 200 gestures into frequency domain using **fast fourier transform** to denoise signal
- Classified different hand movements using support vector machines (**SVMs**) with 82% accuracy
- Improved accuracy by 3% training a neural network providing insight for medical rehabilitation system

SELECTED PROJECTS

Amazon product review rating prediction

June 2019 – Aug 2019

Detection of suspicious or fake Amazon product reviews using machine learning in Python

Demo: https://github.com/LuchaoQi/my-python/blob/master/amazon_project.ipynb

- Extracted Amazon Food Reviews data from Kaggle and cleaned data using **pandas, numpy** and **dfply**
- Tokenized unstructured text of user reviews using **scikit-learn** and **nlTK** for feature construction
- Predicted customer rating categories using **logistic regression** with 0.94 AUC
- Reduced prediction error by 3% using **random forest** to better detect suspicious or fake online reviews

Investigation of Yelp user funnels, Key Performance Indicators (KPIs)

March 2019 - May 2019

Performance analysis of Yelp users & restaurant using SQL

Demo: https://github.com/LuchaoQi/Yelp_Data_Set_SQL

- Wrote **web crawler** to scrape and parse unstructured data from Yelp using **Xpaths, BeautifulSoup** in Python
- Created a database using **MySQL workbench** and imported ~10 GB data file into the database
- Visualized geographic distribution of restaurants with average ratings using **Tableau**
- Performed metrics analysis (**bracket retention, DAU/MAU**) using SQL to measure customer engagement and making suggestions for ways to improve upon KPIs via **A/B testing**

- Created tools (**Shell script, R, Python**) that can be used to perform one-stop analysis from downloading the raw Sequence Read Archive (**SRA**) gene data to investigating the differentially expressed gene matrix
- Performed gene set enrichment analysis (**GSEA**) of profiles obtained from Gene Expression Omnibus (**GEO**)
- Identified significant ($p\text{-value} < 0.05$) co-occurring or mutually exclusive mutated driver genes across different cancer types using **Fisher's exact test, Chi-Square test and Permutation test**
- Identified 50 over-represented genes that may have associations with disease phenotypes

PUBLICATIONS

1. **Qi L**, Zhang Q, Tan Y, et al. Non-contact High-frequency Ultrasound Microbeam Stimulation: A Novel Finding and Potential Causes of Cell Responses. *IEEE Trans Biomed Eng* 2019.
2. **Qi L**, Zhang Q, Lam KH, et al. Calcium fluorescence response of human breast cancer cells by 50-MHz ultrasound microbeam stimulation. Presented at 2017 IEEE International Ultrasonics Symposium (IUS), 6-9 Sept. 2017 2017.