

Education

Massachusetts Institute of Technology

Cambridge, MA

Postdoctoral Research. Laboratory for Computational Physiology.

Research focuses on dynamical treatment regimes, counterfactual simulation models, and reinforcement learning in clinical decision making. (August 2019 - Present)

Harvard Medical School

Boston, MA

Master of Biomedical Informatics, May 2019. Thesis: Sensitivity Analysis of Deep Q-Learning among Treatment of Septic Patients. Studies include Computational Statistics, Machine Learning, Data Science in Medicine, and Database Design.

Kaohsiung Medical University

Kaohsiung, Taiwan

Doctor of Medicine, June 2017. Studies included biochemistry, genetics, pharmacology, pathology, anatomy, physiology and medical microbiology. Computer science course included introduction to algorithms and elements of software construction.

Awards

LEAP Fellowship for the Ministry of Science and Technology of Taiwan (2019).

Research Experience

MIT Laboratory for Computational Physiology

Cambridge, MA

Advisor: LiWei Lehman, Roger Mark, *Postdoctoral Researcher*

Currently developing methodology for simulation of disease trajectory and long-term treatment regime using components of cardiovascular simulator with the goal of examining and validating the counterfactual prediction by the use of G-computation and Recurrent Neural Network.

Formalized, designed and discretized states, action and reward of Dueling Double DQN agent of sepsis treatment. Queried and imputed 4 millions of multivariate time series data of 19,000+ ICU patients from MIMIC electronic health database.

Designed evaluation metrics to characterize behavior of Deep Reinforcement Learning among clinical decision making. Analyzed the influence of different states definition, embedding modules, reward function and other environmental intrinsic factors on DDDQN. (October 2018 - present)

Academia Sinica, Institution of Information Science

Taipei, Taiwan

Advisor: TingYi Sung, *Research Assistant*

Improved efficiency of protein spectrum viewer by refactoring data structure and deploying visitor pattern of fragmented spectrum. Designed and implemented user interface of the spectrum viewer.

Standardized data of breast cancer genomics, 100,000+ DNA, RNA, and phosphates, and selected clinical features to predict expression level of breast cancer proteome. (August 2017 - January 2018)

National Taiwan University Hospital

Taipei, Taiwan

Advisor: LaiFei Pi, *Research Assistant*

Imputed data of electronic health record of 200,000+ patients of SQL database and established prediction model of patient visiting time in outpatient Department of Pulmonary Medicine.

Implemented random forest regression and factorization machine with Libm in Python, with an MSE of 4.3 minutes as the outcome.

Publications	<p>“Sensitivity Analysis of Deep Reinforcement Learning among Septic Treatment.” MingYu Lu, Zach Shahn, Li-wei Lehman, and Roger Mark. Machine Learning for Health (ML4H) Workshop at NeurIPS 2019. (Submitted)</p> <p>“A Biologically Plausible Benchmark for Contextual Bandit Algorithms in Precision Oncology Using in vitro Data.” Niklas Rindtorff, Alexander D’Amour, MingYu Lu, Huahua Zheng, and Nisarg Patel. Machine Learning for Health (ML4H) Workshop at NeurIPS 2019. (Submitted)</p>
Teaching/Mentoring Experience	<p>Health Sciences and Technology, Harvard-MIT Cambridge, MA <i>Collaborative Data Science in Medicine, Faculty</i> Organized curriculum and invited speakers. Supervised and instructed students with medical data analysis. (July 2019 - present)</p> <p>Milan Critical Care Datathon Milan, Italy Helped participants understand medical concept of topics. Organized and facilitated team communication. Instructed and assisted participants with the technique issue of data analytic tool. (February 2019)</p>
Work Experience	<p>National Taiwan University Hospital Taipei, Taiwan <i>Medical Intern/ Intern Team Leader.</i> Core clinical rotation in major specialties, primary care duty, surgical assistance. Analyzed laboratory results, and gathered information during examination to properly diagnose illness. (May 2016 - May 2017)</p> <p>TinyNote https://thetinynotes.com/ Taipei, Taiwan <i>CoFounder & CTO.</i> A website of physician-authored clinical decision support resources, allowing medical professionals to follow the more than 800+ latest guidelines of diseases and clinical inquiry with monthly 180,000+ active users. (November 2016 - present)</p> <p>Responsible for AWS deployment, development and maintenance of back-end APIs, database, text-searching package, and Google search engine optimization.</p>
Leadership	<p>President of Guitar Club Leader at Kaohsiung Medical University. (2013 - 2014), Chief Information Officer of KMU Class 2017. (2015 - 2016)</p>
Skills	<p>Programming/Scripting Languages: Python (proficient), R (proficient), JavaScript (proficient), Java (proficient), php (proficient), C#, HTML, CSS.</p> <p>Data analysis/Machine learning: Numpy, Scikit-Learn, Pandas, Tensorflow, Keras, Pytorch.</p> <p>Database/Query: Postgre, MySQL, MongoDB, BigQuery.</p> <p>Cloud/Web Services/Framework: AWS, GCP, IBM cloud, Nginx, NodeJS, Express.</p> <p>Virtual Environment: Docker, OpenAI Gym/Universe, Anaconda.</p>