Yue Yang Teo

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Personal Profile

I am a science enthusiast that is obsessed with understanding and quantifying everything. One of the greatest fields that have always confounded me is biology. This led me to computational biology, to utilize applied mathematics, or computing, to understand biology. What started out as pure curiosity has brought me to research facilities all over the world, from building biological networks to modelling diseases with machine learning.
These experiences have solidified my dedication to scientific research and my passion to computational biology. Being a strong proponent of AI and data-driven research, my scientific vision is to model and analyze biological systems using machine learning and further fields such as computational neuroscience, bioengineering and precision medicine. Given my passion in research and vision in science, I am ready to kick-start my academic career and embark on my graduate school journey.
By the way, in my humble opinion, the answer isn't 42, it is science.

University Education

2017–2021 **National University of Singapore**.
B.Sc (Hons) Major in Computational Biology
Interdisciplinary Special Programme in Science

2020 **University of California, Santa Cruz**.
Exchange semester

Research Experience

April 2020 –Present **Genome Institute of Singapore, Agency of Science, Technology and Research**.
Advisors: Roger Foo, Greg Tucker-Kellogg
Epigenomics and Epigenetics Molecular Lab

Project (Final Year Thesis)
Characterizing intra-tumor heterogeneity (ITH) of hepatocellular carcinoma (HCC) using integrated analysis of coherent multi-omics data
Description
Dual approach methodology. (i) Multi-dimensional factor analysis used to describe latent dimensions underlying HCC. Downstream analysis of latent dimensions to characterize ITH. (ii) Adopted Gaussian-Mixture-Model-Hidden-Markov-Model to infer hidden states across genomic segments of different omics. Differential states are utilized to characterizes genomic and epigenomic ITH.

March 2020 –July 2020 **Beth Israel Deaconess Medical Center, Harvard Medical School**.
Advisors: Winston Hide
Non-Coding RNA Precision Diagnostics and Therapeutics Core Facility

Project
Using known miRNA::mRNA interactions to derive if miRNA induces statistically differential effect on specific pathway clusters contributing to diseases
Description
Gene set enrichment analysis of RNA-sequencing to derive statistically different pathways. Statistically different pathways are subsequently used to map pathway clusters. Fisher analysis of pathway clusters with known miRNA:mRNA interactions prioritizes miRNA related to disease of interest.

January 2020 –April 2020 **UCSC Genome Institute, University of California, Santa Cruz**.
Advisors: Benedict Paten
Computational Genomics Lab

Project
Investigating deep neural networks for nanopore sequencing basecalling methods
Description
Deciphered the nanopore sequencing signal features utilized by commercial deep learning models for the basecalling. The work here is mapped to a research module where I achieved an A grade.

June 2019– December 2019 **Sackler Faculty of Medicine, Tel Aviv University**.
Advisor: Noam Shomron
Functional Genomics Laboratory

Project
Identifying potential cancer-related genes with deep learning classification
Description
Deep learning classification is done using a quasi-recurrent neural network model with NGS data of cancer and healthy patients. Gradient-based class activation mapping (GRAD-CAM) methodology is used to analyze the deep learning model's parameters.

December 2018– December 2019 **Lee Kong Chian School of Medicine, Nanyang Technological University**.
Advisor: George Augustine
Synaptic Mechanisms and Circuits Laboratory

Project
Modeling the computational role of cholinergic input in a claustral recurrent neural network
Description
The firing-rate network model is built using electrophysiological data collected from claustral neurons in brain slices. Cholinergic input was inspired as a gain-control function. Model showed that cholinergic input toggle network encoding efficiencies of different subpopulations in the claustrum. The work here is mapped to a research module where I achieved an A grade.

May 2018– December 2018 **Department of Physiology, National University of Singapore**.
Advisor: Lim Kah Leong
Neurodegeneration Research Laboratory

Project
Identifying molecular links between Type II Diabetes and Parkinson's Disease using network analysis
Description
Protein-protein interaction (PPI) network built using STRING database. Analysis is done using graph theory algorithms (Random-walk-with-restart) with PPI constructed. The work here is mapped to a research module where I achieved an A grade.

Publications

2020 Nair, A., **Teo, Y.**, Graf, M. & Augustine, G. J. (2020) A functional logic for neurotransmitter co-release in the cholinergic forebrain pathway. Manuscript submitted for review.

2020 **Teo, Y.** Danilevsky, A. & Shomron, N. (2020) Overcoming Interpretability in Deep Learning Cancer Classification. Methods Molecular Biology, Vol. 2243, Noam Shomron (Eds): Deep Sequencing Data Analysis. Publication in progress.

Conference Presentations and Posters

2020 Yeganeh, P.N., **Teo Y.**, Morgan, S., Vlachos, I. & Hide, W. (2020) CARAWAY: Capturing miRNA-controlled coordinated pathway activity. Intelligent Systems for Molecular Biology Conference 2020.

2019 Nair, A., **Teo, Y.**, Graf, M., & Augustine, G,J. (2019). Opposing cholinergic gain control of the claustrum. Society for Neuroscience 49th Annual Meeting. Society for Neuroscience.

2019 Nair, A., **Teo, Y.**, Graf, M., & Augustine, G,J. (2019). Opposing cholinergic gain control of the claustrum. Gordon Research Conference for Modulation of Neural Circuits and Behavior 2019.

Awards & Honours

2018 **Best Presentation Award**.
Integrated Science Congress 2018, National University of Singapore,Singapore
Awarded at the Integrated Science Congress organized by the Special Programme in Science,Faculty of Science, National University of Singapore for presenting research thesis.

Leadership Experience

2020 **Cluster Leader**.
Prince George's Park Residence
Managed a cluster of student residents residing on campus at the Prince George's Park Residence.

2017-2019 **Project Leader**.
Social Committee, Raffles Hall
Planned projects for social events across the entire residence at Raffles Hall. Aimed to facilitate bonding between residents of different blocks in Raffles Hall. Helped to integrate international student residents in Raffles Hall.

2015-2016 **Military Specialist Cadet School Instructor (Infantry)**.
Singapore Armed Forces
Trained cadets to become infantry sergeants at the Specialist Cadet School of the Singapore Armed Forces. Conducted management training, leadership training and physical training. Taught navigation, weapon technicality, urban and non-urban combat skills.

Research Interests

Machine Learning, Artificial Intelligence, Bioinformatics, Precision Medicine, Data Science, Computational Biology, Big Data in Biology, Computational Neuroscience, Mathematical Modeling of Biology, Cloud Computing for Biological Data

Technical Skills

Dry Lab Machine Learning (Tensorflow, Pytorch), Artificial Intelligence, Regression Analysis, Statistical Analysis, Image Analysis, Computer Vision, Bioinformatics, Natural Language Processing, Data Structures & Algorithms, Big Data, Database Systems, Graph Theory

Wet Lab Cell culture, Optogenetics, Western Blotting, DNA-sequencing, RNA-sequencing

Programming Languages

Basic	Javascript, HTML
Intermediate	C, C++, R, LaTeX, bash, MATHEMATICA, Hadoop, Spark, PostgreSQL, AWS, Kubernetes
Advanced	JAVA, MATLAB, Python, Microsoft Windows OS, Linux OS, R

University courses completed

Computing & Statistics	Linear Algebra, Calculus, Probability, Mathematical Statistics, Programming Methodology, Data Structures & Algorithms, Machine Learning, Artificial Intelligence, Natural Language Processing, Computer Networking, Database Systems, Database Systems for Big Data, Regression Analysis
Science	Molecular Genetics, Molecular Cell Biology, Cell Biology, General Chemistry, Genes & Genomes, Computational Biology, Genomic Data Analysis, Bioinformatics

Pre-University Education

2015–2016 **Nanyang Junior College**.
GCE-A Levels (Cambridge Advanced Level Examination)

2013-2014 **Xinmin Secondary School**.
GCE-O Levels (Cambridge Ordinary Level Examination)

Hobbies & General Interests

Science Fiction, Science Podcasts, Video games, Football(Soccer), Floorball, Basketball, Trekking, Travelling

Languages

Chinese	**Native Speaker**
English	**Native Speaker**