



# YUE YANG TEO

science admirer | machine learning enthusiast | computational biologist  
Science is nothing but our feeble attempt at understanding the universe.

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AlanTeoYueYang

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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 for modelling and analyzing biological systems. Being a strong proponent of AI and data-driven research, my scientific vision is to model biological systems using machine learning and further fields such as computational neuroscience, bioengineering, and precision medicine.

## EDUCATION

PhD, Computational and Quantitative Biology (EDCB)

École Polytechnique Fédérale de Lausanne (EPFL)

NeuroRestore

Feb 2022 –

Switzerland

B.Sc (Hons) Major in Computational Biology

National University of Singapore

Aug 2017 – May 2021

Singapore

Exchange Semester

University of California, Santa Cruz

Jan 2020 – Apr 2020

Santa Cruz, CA

## RESEARCH EXPERIENCE

EPFL, NeuroRestore (Role: PhD, Doctoral Assistant)

Advisors: Gregoire Courtine, Jordan Squair

Feb 2022 – Current

Switzerland

- Elucidating the changes in molecular and cellular architecture of spinal cord with respect to spinal cord injury (SCI) and targeted epidural spinal stimulation (TESS)-enabled walking after SCI
- Deciphering the molecular and cellular profiles of the spinal cord injury using a combination of machine learning algorithms and single-cell sequencing technologies

National Cancer Centre of Singapore (Role: Research Officer)

Advisors: Pierce Chow, Greg Tucker-Kellogg, Roger Foo

May 2021 – Dec 2021

Singapore

- Multi-region sampling analysis to characterize patient-specific transcriptomic dysregulation
- Precision medicine application: Novel patient stratification based on patient-specific transcriptomic profile

Genome Institute of Singapore, National Cancer Centre of Singapore

Advisors: Roger Foo, Greg Tucker-Kellogg

April 2020 – May 2021

Singapore

- Characterizing differential multi-omic tumor heterogeneity between HBV-infected and non-viral hepatocellular carcinoma

- Comparing inter and intra tumor heterogeneity of multi-region samples between HBV-infected and non-viral hepatocellular carcinoma at the transcriptomic and metabolomic level.
- Identifying unifying genes, pathways and metabolites contributing to inter/intra-tumor heterogeneity

## BIDMC, Harvard Medical School

**Advisor: Winston Hide**

📅 March 2020 – July 2020

📍 Boston, MA

- Prioritizing disease-related miRNAs using known miRNA:mRNA interactions and pathway clusters
- Enriched pathways are used to map pathway clusters.
- Fisher analysis of pathway clusters with known miRNA:mRNA interactions prioritizes miRNA related to disease of interest.

## UCSC Genome Institute

**Advisor: Benedict Paten**

📅 January 2020 – April 2020

📍 Santa Cruz, CA

- Investigating deep neural networks for nanopore sequencing basecalling methods
- Deciphered the nanopore sequencing signal features utilized by commercial deep learning models for the basecalling.

## Sackler Faculty of Medicine, Tel Aviv University

**Advisor: Noam Shomron**

📅 June 2019 – Dec 2019

📍 Tel Aviv, Israel

- Identifying cancer-related genes with deep learning classification
- Deep learning classification is done using a QRNN model with NGS data of cancer vs healthy patients.
- GRAD-CAM methodology is used to analyze the deep learning model's parameters.

## Lee Kong Chian School of Medicine, Nanyang Technological University

**Advisor: George Augustine**

📅 Dec 2018 – Dec 2019

📍 Singapore

- Modeling the computational role of cholinergic input in a claustral RNN
- The firing-rate network model is built using electrophysiological data collected from claustral neurons in brain slices.
- Model showed that cholinergic input toggle network encoding efficiencies of different subpopulations in the claustrum

## National University of Singapore

**Advisor: Lim Kah Leong**

📅 May 2018 – Dec 2018

📍 Singapore

- Identifying molecular links between Type II Diabetes and Parkinson's Disease using network analysis
- Protein-protein interaction (PPI) network built using STRING database.
- Analysis is done using graph theory algorithms (Random-walk-with-restart) with PPI constructed.

## PUBLICATIONS

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Skinneider, MA., Gautier, M., **Teo, AYY.**, ..., Anderson, MA., Squair, JW. & Courtine, G.(2023) *The Tabulae Paralytica*: Multimodal single-cell and spatial atlases of spinal cord injury [Preprint].  
<https://doi.org/10.1101/2023.06.23.544348>

Jeon, AJ., **Teo, AYY.**, ..., Tucker-Kellogg, G., Foo, RSY., & Chow, PKH (2023) Multi-region sampling with paired sample sequencing analyses reveals sub-groups of patients with novel patient-specific dysregulation in Hepatocellular Carcinoma. *BMC Cancer*, 23(1).  
<https://doi.org/10.1186/s12885-022-10444-3>

Jeon, AJ., Anene-Nzulu, CG., **Teo, AYY.**, ..., & Chow, PKH (2023) A genomic enhancer signature associates with hepatocellular carcinoma prognosis. *JHEP Reports*, 5(6), p. 100715.  
<https://doi.org/10.1016/j.jhepr.2023.100715>

Naderi, P., **Teo, AYY.**, Karagkouni, D., Pita-Juárez, Y., Morgan, S., Slack, F., Vlachos, I. & Winston Hide (2023). PanomiR: A systems biology framework for analysis of multi-pathway targeting by miRNAs. [Preprint].  
<https://doi.org/10.1101/2022.07.12.499819>

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Nair, A., Teo, AYY., Augustine, G. J. & Graf, M. (2023) A functional logic for neurotransmitter co-release in the cholinergic forebrain pathway. Proceedings of the National Academy of Sciences, 120(28).  
<https://doi.org/10.1073/pnas.2218830120>

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Teo, AYY., Danilevsky, A. & Shomron, N. (2021) Overcoming Interpretability in Deep Learning Cancer Classification. Methods Mol Biol. 2021;2243:297-309.  
[https://doi.org/10.1007/978-1-0716-1103-6\\_15](https://doi.org/10.1007/978-1-0716-1103-6_15)

## POSTERS

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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.

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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.

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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

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**Best Presentation Award.**  
Integrated Science Congress 2018  
National University of Singapore, Singapore.

## RESEARCH PROGRAMME

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Interdisciplinary Special Programme in Science  
**National University of Singapore**

📅 Aug 2017 – Dec 2018

📍 Singapore

## LEADERSHIP EXPERIENCE

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Project Leader  
**Social Committee, Raffles Hall**

📅 Aug 2017 – Aug 2019

📍 Singapore

- Planned projects for social events across the entire residence at Raffles Hall.
- Aimed to facilitate bonding between residents of different blocks.
- Helped to integrate international student residents in Raffles Hall.

Military Specialist Cadet School Instructor (Infantry)  
**Singapore Armed Forces**

📅 Feb 2015 – Dec 2016

📍 Singapore

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

## RESEARCH INTERESTS

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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

## PROGRAMMING LANGUAGES

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Basic

Javascript, HTML

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#### Intermediate

C, C++, R,  $\LaTeX$ , bash, Mathematica, Hadoop, Spark, PostgreSQL, AWS, Kubernetes

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#### Advanced

java, Matlab, Python, R

## TECHNICAL SKILLS

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#### 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

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#### Wet Lab

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

## LANGUAGES

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English (Native Speaker)

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Chinese (Native Speaker)

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## OTHER INTERESTS

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