Joseph Lee

https://jleechung.github.io
joseph.lee@bnc.ox.ac.uk
Google Scholar · GitHub

Education

M.Sc. Statistical Science 10/2023 –
University of Oxford, UK
Thesis: *In-context learning in large language models: insights and algorithms*
Supervisor: Yee Whye Teh
Grade: –

B.Sc. (Hons.) Computational Biology 08/2018 – 07/2022
Minor in Mathematics, Minor in Philosophy
National University of Singapore, Singapore
Thesis: *Modelling degradation bias in long read RNA-seq for accurate isoform quantification*
Supervisor: Jonathan Göke
Grade: Honours (Highest Distinction)

Experience

Bioinformatics Specialist 07/2022 – 09/2023
Laboratory of Systems Biology and Data Analytics,
Genome Institute of Singapore
Supervisors: Jagadish Sankaran, Shyam Prabhakar
Led computational method development for learning invariant representations of single-cell morphology using signal processing and graph-based methods. Abstract selected for oral presentation at *Advances in Genome Biology and Technology* 2024.

Research Intern 05/2021 – 07/2021
Laboratory of Systems Biology and Data Analytics,
Genome Institute of Singapore
Supervisor: Vipul Singhal, Nigel Chou
Led software engineering and performed formal analysis for BANKSY, a method for spatially-aware cell-typing and tissue domain identification using azimuthal Fourier transforms. Optimised runtime by 50x from initial implementations. Published in *Nature Genetics* 2024.

Research Intern and Thesis Student 05/2020 – 05/2022
Laboratory of Computational Transcriptomics,
Genome Institute of Singapore
Supervisors: Jonathan Göke, Chen Ying, Andre Sim
Developed a survival analysis-based statistical model and implemented an expectation maximisation algorithm for degradation-aware isoform quantification from long-read RNA-seq. Participated in the Long Read Genome Annotation Assessment Project. Optimised the runtime of `proActiv`, a software for estimating promoter activity, by 10x from initial implementations.

Research Assistant 05/2019 – 07/2021
Computational and Statistical Systems Biology Lab,
National University of Singapore
Supervisor: Hyungwon Choi
Performed statistical analysis of next-generation sequencing data. Developed gene-essentiality classification algorithms for genome-wide CRISPR screen data. Developed `eGFRsmooth`, software for trajectory inference from time-series clinical data with Gaussian kernels.

Selected Publications & Software

Journal Articles

Vipul Singhal, Nigel Chou, **Joseph Lee**, Jinyue Liu, Wan Kee Chock, Li Lin, Yun-Ching Chang, Erica Teo, Hwee Kuan Lee, Kok Hao Chen and Shyam Prabhakar. "BANKSY unifies cell-typing and tissue domain segmentation for spatial genomics analysis". *Nature Genetics*. 2024

LRGASP consortium. "Systematic assessment of long-read RNA-seq methods for transcript identification and quantification". *Nature Methods*. 2024

Ying Chen, Andre Sim, Yuk Kei Wan, Keith Yeo, **Joseph Lee**, Min Hao Ling, Michael I. Love, Jonathan Göke. "Context-Aware Transcript Quantification from Long Read RNA-Seq data with Bambu". *Nature Methods*. 2023

Joe Wee Jian Ong, Kai Sen Tan, **Joseph Lee**, Ju Ee Seet, Hyung Won Choi, Siok Ghee Ler, Jayantha Gunaratne, Teluguakula Narasaraju, Lok-To Sham, Volker Patzel, Vincent T Chow. "Differential effects of microRNAs miR-21, miR-99 and miR-145 on lung regeneration and inflammation during recovery from influenza pneumonia". *Journal of Medical Virology*. 2023

Altea Targa, Katherine E Larrimore, Cheng Kit Wong, Yu Lin Chong, Ronald Fung, **Joseph Lee**, Hyungwon Choi and Giulia Rancati. "Non-genetic and genetic rewiring underlie adaptation to hypomorphic alleles of an essential gene". *The EMBO Journal*. 2021

Posters

Jagadish Sankaran, Giovani Wijaya, **Joseph Lee**, Vaidehi Krishnan, Nirmala Arul Rayan, Kok Hao Chen, Hein Than, Sin Tiong Ong, Shyam Prabhakar. "Morphogenomics: combining nuclear morphology with gene expression". *Advances in Genome Biology and Technology*. 2023

Talks

Joseph Lee, Deniz Demircioğlu, Jonathan Göke. "Estimating promoter activity from bulk and single-cell RNA-seq data". *Bioconductor conference*. 2021

Software

Joseph Lee, Vipul Singhal. `Banksy`. *Bioconductor*. 53 ☆ 2024

Joseph Lee, Deniz Demircioğlu, Jonathan Göke. `proActiv`. *Bioconductor*. 45 ☆ 2020

Other Projects

Modelling spatiotemporal omics data 2024
University of Oxford
Supervisor: Xiaowen Dong
With Julia Zhao (Harvard-MIT). Using deep graph embedding and flow matching for modelling spatiotemporal gene expression.

Identifying spatially variable features 2023
Genome Institute of Singapore
Used the graph Fourier transform to identifying genes with spatially varying expression, extracting spatial patterns using k-nearest neighbours in the spectral domain.

***n*-gram language modelling** 2021
National University of Singapore
Built a Slack chatbot using an n-gram language model. Implemented regex-based tokenisation, add-k smoothing, backoff and interpolation.

Awards & Scholarships

Bioconductor Travel Scholarship. Awarded funding amounting to USD1500.00 by Bioconductor for Bioc2024 conference attendance. 2024

Graduate Research Award. Awarded funding amounting to GBP225.00 by Brasenose College, University of Oxford for research related activities. 2024

Lijen Industrial Development Medal. Awarded by the National University of Singapore to the Honours year student with the best academic thesis. 2022

A*STAR Research Internship Award. Awarded funding for research on method development for spatial transcriptomics in the Laboratory of Imagenomics at the Genome Institute of Singapore with Kok Hao Chen. 2021

Lim Soo Peng Book Prize. Awarded by the Faculty of Science to the best student in the Computer Science stream in the Science II Examinations. 2020

Dean's List (Spring 2019/20, Spring 2020/21, Fall 2021/22). Awarded to the top 5% of total undergraduates in the Faculty of Science for excellence in academic performance.

NUS Global Merit Scholarship. Awarded by the National University of Singapore to high calibre individuals who demonstrate academic excellence, present excellent co-curricular activities records and exhibit outstanding leadership qualities. 2018

Best Full-time National Serviceman (NSF) Award. Awarded to the best NSF from the Clearance Diving Group, Naval Diving Unit, Republic of Singapore Navy. 2017