Khachatur Dallakyan

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EDUCATION

Karolinska Institute, Stockholm University — Sweden
Joint Master's Programme in Health Informatics — 2024-2026 (expected)
Awards: The Swedish Institute Scholarship for Global Professionals

The Chinese University of Hong Kong — Hong Kong
Bachelor of Sc. in Artificial Intelligence: Systems and Technologies (GPA: 3.29 / 4.00) — 2020-2024
Awards: Second class upper division with Honours, Belt and Road Scholarship

International Baccalaureate Diploma Programme at Quantum College — Armenia
Total points: 37/45 — 2018-2020
Subjects: Mathematics, Computer Science, ITGS, Armenian, Economics, English.

RESEARCH AND WORK EXPERIENCE

Exploring the Enteric Nervous System (ENS) through Single-Cell Transcriptomics — 2025

Main objective of the research is to find regulatory mechanisms in embryonic ENS, by exploring spetio-temporal differences for ENS cells, namely progenitors, neuroblasts and SCPs between regions and timepoints.

- Finetuned various foundation models (scGPT, cell2sentence) with custom learning objectives to create region and timepoint classifiers.
- Utilized the classifiers to simulate in-silico perturbation of various candidate genes and the attention architecture to study gene-to-gene relations.
- Applied SCENIC to infer gene regulatory networks and identify transcription factor motifs, though database-derived predictions produced many false positives. As a next step, we plan to integrate scATAC-seq data from our lab to improve motif detection together with conventional cell fate prediction models like RegVelo to improve in-silico perturbation predictions.

Biopsy QR Code Management System — 2025

- Developed biopsy management system for Freiburg's medical center.

Benchmarking Single Cell Foundation Models (FM) for Retrieval — 2024-2025

Benchmarking traditional methods and FMs across diverse biological tasks.

- Benchmarked retrieval accuracy, diversity, biomarker identification, and novel cell type detection across multiple platforms, species, and technologies.
- Evaluated and compared traditional methods with foundation models (scGPT, Geneformer, scMulan, UCE, SCimilairty, scFoundation), designing benchmarks for complex scenarios with ambiguous or incomplete ground truth.

Prediction of Cellular Morphology with Image-to-image Translation Models — 2023-2024

- To benchmark MorphDiff established baseline using the DMIT and DRIT++ models.
- Adapted the model architectures to process 5 channel cellular morphology imaging data.

Internship at Centre for Perceptual and Interactive Intelligence (CPII) — 2023

AI research company targeting sectors of healthcare, urban services, and reindustrialization

- Developed a prototype for speech-based interaction with LLMs without relying on ASR or TTS.
- Utilized speech representations from Hubert pretrained model to finetune LLAMA.

Internship at ONEFi (iPYGG) — 2022

Fintech company aiming to connect Asia-pacific banking into a single application.

- Developed ML models for transaction classification and description summarization.

PREPRINTS AND JOURNAL PUBLICATIONS

Prediction of Cellular Morphology Change Under Perturbations with Transcriptome Guided Diffusion Model [paper] 2025

Xuesong Wang, Yimin Fan, Yucheng Guo, Chenghao Fu, Kinhei Lee, Khachatur Dallakyan, Yaxuan Li, Qijin Yin, Yu Li, and Le Song

SCMBench: Benchmarking Domain-specific and Foundation Models for Single-cell Multi-omics Data Integration [preprint] 2025

Yixuan Wang, Yimin Fan, Xuesong Wang, Tingyang Yu, Yongshuo Zong, Xinyuan Liu, Meitong Liu, Qing Li, Kin hei Lee, Khachatur Dallakyan, Junjie Huang, Gengjie Jia, Jiao Yuan, Ting-Fung Chan, Xin Gao, Irwin King, Yu Li

EXTRACURRICULAR ACTIVITIES

KI-Mayo 30th annual scientific meeting 2024

- Helped to organize main and breakout sessions for "AI and health" section.

Videogame modding 2024

- Modified WW2 videogame resource trading algorithm for AI to prioritize historical allies and trade partners.

Armenian Red Cross Society (ARCS) 2019-2020

- Volunteered as part of the "Social Support and Health Care" team.

Global Innovation Forum 2019

- Volunteered for GIF during Aurora Humanitarian Initiative
- Helped to organize a talk about the scientific computing framework Torch and its use cases.

Competitive programming 2017-2019

- Codeforces: https://codeforces.com/profile/khachdallak
- Developed and tested competitive programming problems for Armenian SPOJ: https://am.spoj.com/problems/TIGRANMEC/

ACHIEVEMENTS

The Swedish Institute Scholarship for Global Professionals 2024

- Awarded for demonstrated academic excellence and strong leadership potential.

CUHK Data Hack 2024 2024

- Champion team during the Data Solutions for Social Good Hackathon.
- Implemented random forest algorithm for early detection and prevention of drug abuse.

"Belt and Road" scholarship 2020

- Scholarship for outstanding new students from the Belt and Road Region countries.

"Best student" state prize 2018

- Republic of Armenia State Prize in Information Technologies.

"Algorithmization Methods" Programming Contest 2017

- Second and third places (top 0.5%) in Autumn and Winter Cup contests respectively.