Ela Fallik

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Education

Ph.D. Candidate in Computer Science, the Hebrew University of Jerusalem (HUJI)
Under the supervision of Prof. Nir Friedman *Since 2022*

Research subject: My focus lies in probabilistic modeling of biological sequencing data. In particular, how can we construct robust and explainable models representing complex real-world distributions? Currently, my research explores the integration of state-of-the-art architectures with traditional probabilistic models to analyze *liquid biopsy* data, with the ultimate goal of developing minimally invasive diagnostic tools.

M.Sc. in Computer Science, HUJI
Thesis title: Cell-Type Decomposition with Component Variation using VarNMF
Final grade: 97.1 *2020 - 2022*

B.Sc. in Computer Science and Mathematics, HUJI
Final grades: CS - 96.0, Math - 93.8 *2016 - 2019*

Publications and Presentations

Generalization of scRNA foundation models to cfChIP-seq data
Poster presentation at IBM Forward, Faster *March 2025*

VarNMF - non-negative probabilistic factorization with source variation
Ela Fallik, Nir Friedman, *Bioinformatics* 41.1 (2025) *Jan 2025*

Cell-type decomposition with program variation in liquid biopsies
Poster presentation at CNAPS 2024, Bioinformatics approaches for cfDNA analysis *March 2024*

Cell-type decomposition with component variation
Presentation at FISEB/ILANIT 2023, Big data in health and disease *Feb 2023*

Honors and Awards

Dean's Honor List, Faculty of Science, HUJI *2017, 2018, 2019, 2020*

Excellence Program for B.Sc. Students, Computer Science Faculty , HUJI *2017-2019*

Experience

Prof. Nir Friedman's lab for computational biology, HUJI
Graduate Student *Since 2021*

Ph.D. research topics:

- Developing probabilistic models for analysis of various types of liquid biopsy data
- Integrating state-of-the-art architectures and probabilistic graphical models to promote explainability
- Combining multiple data types to increase robustness and improve performance

M.Sc. research:

- Blind separation of mixed sources, taking into account the sources variation in signal across the population
- Application in liquid biopsy assay developed in the lab

Mentoring undergraduate students in various lab projects

Tutoring students following Miluim service
Volunteer work   *2025*

Computer Cons. Workshop: From Nand to Tetris course, HUJI
Teaching Assistant   *2020, Since 2022*

Implementing the grading system, providing administrative support and addressing student inquiries

Probabilistic Methods in Artificial Intelligence course, HUJI
Teaching Assistant   *2021-2024*

Teaching the general framework of Probabilistic Graphical Modeling, which aims to represent complex joint distributions as factorizable factors using graphs. This includes Representation, Inference and Learning chapters, as well as Reinforcement Learning. My role included:

- Developing new teaching materials for an advanced machine learning course
- Leading class discussions and recitations
- Implementing visualization tools for machine learning material to aid teaching

Prof. Tommy Kaplan's lab for computational biology, HUJI
Undergraduate Lab Project   *2019*

Detecting replication origins in individual cells using Nanopore sequencing

Atidim Program, HUJI
Computer Science and Math Tutor   *2018*

Tutoring and mentoring undergraduate students from socioeconomic and geographical periphery

Skills

Programming	Python, Java, C, C++
Languages	Hebrew (native), English
Algorithmic	• Development of advanced algorithms for biological data • Practical applications of Probabilistic Graphical Models • Statistical machine learning • Big data analysis