Alexander Kagan

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Research Interests

My interests lie in the intersection of statistical network analysis and bioinformatics, with primary focus on:

- Latent space models for collections of networks with shared structure
- Modeling of information diffusion on networks with applications to epidemiology and influence maximization
- Model selection and cross-validation in network-assisted regression problems
- Hierarchical feature selection for prediction problems with extensive drop-outs motivated by proteomics and aging

Education

University of Michigan *Ann Arbor, MI, USA*
Ph.D. in Statistics (advised by Professors Liza Levina and Ji Zhu) *2021 - 2026 (expected)*
Outstanding Department Service Award (2025) for chairing the org. committee of a 150-person Stats symposium

Skolkovo Institute of Science and Technology *Moscow, Russia*
M.S. in Computer Science (GPA: 4.0/4.0) *2020 - 2021*

Yandex School of Data Analysis *Moscow, Russia*
M.S. equivalent certificate in Data Science (GPA: 3.8/4.0) *2019 - 2021*

National Research University Higher School of Economics *Moscow, Russia*
B.S. (with Honors) in Mathematics (GPA: 3.9/4.0) *2016 - 2020*

Research and Work Experience

Sanofi *Cambridge, MA, USA*
R&D Computational Science Intern (*advised by Prof. Ziv Bar-Joseph)* *Summer 2024*
- Developed statistical tools based on Temporal Graph Neural Networks for discovering new biomarkers governing the patient's recovery process, with applications to psoriasis and Crohn's disease.

Kirshner Lab, Harvard Medical School *Cambridge, MA, USA*
Research Assistant *(advised by Prof. Leon Peshkin)* *Jan 2021 - Apr. 2024*
- Led a group of three MSc students developing hierarchical variable selection methods for classification problems with extensive dropouts, e.g., cell-type prediction with single-cell data
- Supervised two Ph.D. students applying Active Learning methods to identify the optimal order of sequential phenotype-to-drug response measurements.
- Developed function-on-function regression methods for phenotype prediction given kinase responses to drugs in multiple doses
- Developed automatic cell nuclei detection methods for liver images using UNet CNNs

MRM Proteomics *Montreal, Canada*
Research Intern *(advised by Prof. Christoph Borchers)* *Summer 2021*
- Developed dimension reduction techniques allowing robust extraction of cancer biomarkers from patient's proteomics and metabolomics measurements.

Juicy Labs *Moscow, Russia*
Junior Data Scientist *July 2019 - Feb 2020*
- Developed new credit scoring models using linear regression, random forest, and boosting.

Computing Skills

Proficient in Python (Numpy, Pandas, Sklearn, Matplotlib, PyTorch, Scipy, NetworkX, JAX, CVXPY), R, and Matlab

Publications

Published

Noe, M., Parisi, E., Rifat, S., Navitskis, L., Conway, D., Deshmukh, A., Kagan, A., Millward, D., Chung, E.
Comparison of 1st Year and 3rd Year ECGs in Collegiate Athletes. Journal of the American College of Cardiology

Under Review or Preprinted

Kagan, A., Levina, E., Zhu, J.
Flexible Modeling of Influence Propagation through a Network with Statistical Guarantees JMLR

Mathur, S., Kagan, A., Passaban, P., Mattoo, H., Hasanaj, E., Bar-Joseph, Z.
Temporal Foundation Models for Clinical Transcriptomics Data Bioinformatics

Kagan, A., MacDonald, P., Levina, E., Zhu, J. *Latent Space Models for Grouped Multiplex Networks with Shared Structure*. Arxiv

Kagan, A., Levina, E., Zhu, J. *Influence Maximization under General Linear Threshold Models*. Arxiv

In Preparation

Kagan, A., Tang, T., Levina, E., Zhu, J. *Cross Validation for Network Regression*.

Nano, M., Harwood, J., Kagan, A., Lukaszewicz, G., Kirschner, M., Peshkin, L., Montell, D.
Kinome regression identifies critical modulators of cellular resilience.

Presentations and Posters

Presentations

2024 **CFE-CMStatistics**, London, UK
2024 **Joint Statistical Meetings**, Portland, OR, USA
2023 **Joint Statistical Meetings**, Toronto, ON, Canada

Posters

2023 **Statistical Network Analysis and Beyond (***Best poster award)*, Anchorage, AK, USA
2023 **ICSA Applied Statistics Symposium (***Honorable mention)*, Ann Arbor, MI, USA
2023 **MSSISS (***Best poster award)*, Ann Arbor, MI, USA

Teaching Experience

Graduate Student Instructor, **University of Michigan**

1. *Data Science 415: Data Mining and Statistical Learning* (upper undergraduate level) *Fall 2025*
   - Taught weekly lab sections (~20 students), created new educational Python notebooks
2. *STATS 485: Capstone Seminar* (upper undergraduate level) *Fall 2022*
   - Held office hours, graded data analysis reports.
3. *STATS 250: Introduction to Statistics and Data Analysis* (lower undergraduate level) *Winter 2022*
   - Taught weekly lab sections (~40 students), held office hours, graded homework and exams.
4. *STATS 426: Introduction to Theoretical Statistics* (upper undergraduate level) *Fall 2021*
   - Held office hours, graded homework and exams.

Languages

English (fluent), Russian (native), German (upper-intermediate), French (intermediate), Hebrew (intermediate)