Nikolay S. Markov

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Machine learning scientist in biomedical field with expertise in developing and applying advanced ML models to multimodal healthcare data. Skilled in building predictive algorithms using clinical, transcriptomic, and imaging data to derive actionable insights that improve patient outcomes, and propose new therapies. Experienced in communicating complex technical findings to diverse stakeholders while collaborating across interdisciplinary teams.

Technical expertise

- **Machine learning**
  Deep learning frameworks (torch, jax), large language models, multimodal fusion, embedding representations, bayesian modeling

- **Healthcare data**
  Electronic health records (EHR), clinical notes analysis, single-cell RNA-seq, spatial transcriptomics, imaging data, statistics

- **Software & tools**
  Python, R, SQL, Linux, computational clusters, interactive visualizations, pipelines

- **Leadership**
  Cross-functional collaboration, project management, team management, mentorship, scientific communication

Work experience

Ph.D. researcher, Division of Pulmonary and Critical Care Medicine,   2022–present
Feinberg School of Medicine, Northwestern University, Chicago, USA
- Developed machine learning models integrating EHR and RNA-seq data to predict patient outcomes from severe pneumonia
- Created interpretable ML algorithms to identify key molecular features across multiple data modalities
- Acquired external funding for the project through competitive AHA predoctoral fellowship
- Consulted Northwestern students and faculty on deep learning, data science and data visualization
- Presented and published our research in 3 peer-reviewed papers

Post-baccalaureate research fellow, bioinformatics, Division of Pulmonary and Critical Care Medicine,   2019–2022
Feinberg School of Medicine, Northwestern University, Chicago, USA
- Built and deployed machine learning pipelines for integrated analysis of high-dimensional transcriptomic data
- Engineered feature extraction algorithms for clinical EHR data to identify patient outcome predictors
- Developed interactive visualization tools to present complex analysis results to clinical teams
- Maintained data processing infrastructure for sensitive healthcare data across multiple research teams

Head of maintenance tools development group, Yandex, Moscow, Russia   2014–2017
- Managed a team of 6 engineers: hiring, mentoring, resolving conflicts, improving performance
- Developed, designed and supported tools for system administrators and other employees

Full-stack software engineer, Yandex, Moscow, Russia   2007–2014
- Identified employees' workflows bottlenecks for automation
- Developed, designed and supported web-services and console tools for system administrators and other employees

Software engineer, Art. Lebedev Studio, Moscow, Russia   2006–2007
Developed and supported web-sites and a content management system

Key publications

(* denotes equal contribution)

Markov NS, […], Budinger GRS, Singer BD, Morales-Nebreda L, NU SCRIPT Study Investigators.   2024
A distinctive evolution of alveolar T cell responses is associated with clinical outcomes in unvaccinated patients with SARS-CoV-2 pneumonia. *Nature Immunology*. 10.1038/s41590-024-01914-w ↻

Gao CA*, **Markov NS***, Stoeger T*, […], Misharin AV, Singer BD, NU SCRIPT Study Investigators.   2023
Machine learning links unresolving secondary pneumonia to mortality in patients with severe pneumonia, including COVID-19. *The Journal of Clinical Investigation (JCI)*. 10.1172/JCI170682 ↻

Sikkema L, Ramírez-Suástegui C, Strobl DC, Gillett TE, Zappia L, Madissoon E, **Markov NS**, […], Theis FJ.   2023
An integrated cell atlas of the lung in health and disease. *Nature Medicine*. 10.1038/s41591-023-02327-2 ↻

Speir ML, Bhaduri A, **Markov NS**, […], Pollen AA, Raney BJ, Seninge L, Kent WJ, Haeussler M.   2021
UCSC Cell Browser: visualize your single-cell data. *Bioinformatics*. 10.1093/bioinformatics/btab503 ↻

Grant RA*, Morales-Nebreda L*, **Markov NS***, […], Budinger GRS, Misharin AV, Singer BD, Wunderink RG.   2021
Circuits between infected macrophages and T cells in SARS-CoV-2 pneumonia. *Nature*. 10.1038/s41586-020-03148-w ↻

Education

Ph.D. in Computational Biology, Northwestern University, Chicago, USA   2022–2025 (anticipated in June)
Driskill Graduate Program in Life Sciences

M.S. in Bioinformatics, Newcastle University, Newcastle upon Tyne, UK   2017–2018
With distinction

Undergraduate coursework in Biology, Genetics, Moscow State University, Moscow, Russia   2003–2006