Michal Golovanevsky

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Education:

<u>Ph.D Candidate. Brown University, Providence, RI (2021-2026)</u>
Computer Science, **GPA: 4.0**

<u>M.S. Brown University, Providence, RI (2021-2023)</u>
Computer Science, **GPA: 4.0**

<u>B.S. California Polytechnic University, San Luis Obispo (2016-2020)</u>
Major: Applied Mathematics; Minor: Data Science, **GPA 3.9**

Publications:

- "Pixels Versus Priors: Controlling Knowledge Priors in Vision-Language Models through Visual Counterfacts" (*under review*)
- "Forgotten Polygons: Multimodal Large Language Models are Shape-Blind" (**ACL 2025**)
- "What Do VLMs NOTICE? A Mechanistic Interpretability Pipeline for Gaussian-Noise-free Text-Image Corruption and Evaluation" *(NAACL 2025)*
- "One-Versus-Others Attention: Scalable Multimodal Integration for Biomedical Data"
  - ***Oral presentation***, *Pacific Symposium on Biocomputing (PSB) 2025*
  - ***Oral presentation***, *ICML 2024 Workshop on Accessible and Efficient Foundation Models for Biological Discovery*
- Multimodal Attention-based Deep Learning for Alzheimer's Disease Diagnosis. *JAMIA*, doi:10.1093/jamia/ocac168

Work Experience:

<u>Ph.D. Researcher, Health NLP Lab & Singh Lab, Brown University, 2021 - Current:</u>

- Thesis focus: Developing scalable and interpretable methods for multimodal integration.
- Mechanistic Interpretability: Studying the inner workings of VLMs, including causal mediation analysis, model steering, and reasoning capabilities.
- Contrastive Learning: Developed a novel non-pairwise contrastive loss formula optimized for diverse multimodal datasets, for unsupervised clinical decision making.
- Attention Mechanism: Created a multimodal attention mechanism for efficient modality integration, reducing complexity from quadratic to linear with respect to the number of modalities.

<u>Applied Research Scientist Intern, Amazon Web Services, Summer 2024:</u>

- Developed a unified RAG pipeline enabling efficient, joint fine-tuning of retriever and generator models.
- Optimized the combination of the fine-tuned retriever and generator models through a weighted formula for enhanced performance *(publication under internal review)*.

<u>Data Scientist, Specific Diagnostics, 2020 - 2021:</u>

- Head of the daily maintenance and improvement of the algorithm that classifies growth of bacteria in the presence of a drug for hundreds of bacteria-drug combinations, using Python.
- Automated error-correcting algorithm that verifies whether there was manual data entry mistake or if there was a misclassification, using ground truth data.
- Used machine learning to classify whether a bacteria is gram-positive, gram-negative, or yeast, through given sensor data, to increase the speed of the diagnostics processes.

<u>Researcher, Cal Poly Statistics Department, 2019 - 2021:</u>

- Developed and expanded R Shiny app for conducting exploratory bioacoustics.
- Created a sound segmentation algorithm that distinguish between marine animal sounds and background noise.

<u>Researcher, Amazon Web Services, DxHub Cal Poly, 2020:</u>

- Used image classification via convolutional neural networks in Tensorflow to automate the identification and geotagging of key road features such as pedestrian facilities, lanes, and traffic signals to substantially lower the diagnostic cost on a global scale.

<u>Research Experience for Undergraduates, NSF, Summer 2020:</u>

- Worked with Global Emancipation Network (leading organization in the U.S. in disrupting human trafficking operations using data science) to create an unsupervised algorithm that evaluates the probability that a massage business is involved in illicit activities.

<u>Software Engineering Intern, Convexum, Summer 2018:</u>

- Developed algorithms to help optimize drone landing points for the Convexum's sensors, which prevented the clashing of multiple drones at landing time.

Programming Skills:

- Python
- PyTorch
- Tensorflow
- DeepSpeed
- Scikit-Learn
- Pandas
- Jupyter Notebooks
- R

Awards and Grants:

- T-32 NIH Predoctoral Biological Data Science Fellowship 2022
- Robert P. Balles Award for Graduating Senior Mathematical Excellence
- NSF Research Grant Award (#1936331)
- William and Linda Frost Research Grant (#201)

Teaching:

- Deep Learning Graduate TA (Spring 24')
- NSF REU Study Group Leader (Summer 23')
- Polygence Research Mentor (Fall 21' – Spring 24')