**Akshay Manglik**
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## Education

2021–2025 B.A. in Computer Science and Economics, Columbia University
Minor in Mathematics
GPA: 4.01/4.33, Major GPA: 4.07/4.33
Courses: Machine Learning, High Performance Machine Learning, Artificial Intelligence, Natural Language Processing, Real Analysis, Algorithms, Probability Theory, Quantum Computing, Machine Learning & Causality, Linear Algebra, Data Structures, Game Theory and Political Theory

## Research Experience

2023–2024 AlQuraishi Lab, Columbia University
• Adapted AlphaFold2 for single sequence protein structure prediction.
• Analyzed scaling laws for data composition, model size, and data size.

2022–2023 Schrauwen Lab, Columbia Irving Medical Center
• Conducted differential DNA methylation analysis using R to analyze epigenetic factors in epilepsy. Analyzed 750K+ DNA regions.
• Used de novo assembly packages to analyze long-read genomic sequences.

2022–Present Dynamic Perception & Memory Lab, Columbia
• Analyzed fMRI and language data to understand neural and semantic representations generated by the method of loci memory technique.
• 2nd author of preprint. Presented findings at OHBM 2023.

2019–2021 Quantitative Imaging and AI Lab, Stanford
• Developed first deep learning architecture for ocular melanoma diagnosis. Improved state-of-the-art accuracy by 11% using CNNs.

## Industry Experience

2024 AI Engineering Intern, PayPal
• Developed NLP vector search system for regulatory compliance. PayPal intends to patent system.
• System projected to save $10M+/year through false positive reduction.

2023–2024 Research Intern, Johns Hopkins Applied Physics Lab
• Researched techniques to extract heart rate from drone video footage. Investigated architectures and data augmentations for robustness.
• Developed segmentation and labeling pipeline using pretrained vision transformers to augment supervised training of wound detection algorithms.

## Teaching Experience

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| 2025-Present | Incoming Course Assistant, Columbia University<br>• Spring 2025 Course Assistant for "Neural Networks and Deep Learning" graduate-level topics course taught by Prof. Rich Zemel. |
| 2021-2024 | Assistant Debate Coach, The Harker School<br>• Coached 20+ nationally-ranked students to debate core issues in politics, economics, and philosophy. Students have won major national championships.<br>• Adjudicated 100+ debate rounds at national tournaments. |
| 2021–2021 | Debate Instructor, Victory Briefs Institute<br>• Taught students argumentative concepts for 3-week debate camp. Developed curricula, and led advanced seminars on rhetorical theory. |

## Independent Research and Projects

1. **Test-Time Optimization Scaling Laws** (2024–Present)
   Course project supervised by Prof. Kaoutar El Maghraoui (IBM Research). Investigating scaling behavior of test-time search, sampling, and prompting methods, across model families, model sizes, training data levels, and types of reasoning, using "Observational Scaling Laws" framework for 5+ benchmarks. Developing metrics for cost-aware inference strategy selection. **Link to Interim Preprint**. **Link to Codebase**.

2. **Belief State Space Models** (2024–Present)
   Independent collaboration with Dr. Alex Lamb & Dr. John Langford (Microsoft Research NYC). Extending "Belief State Transformers" bidirectional training objective to selective state space models, as evaluated on star graph problem.

3. **Evaluating the Robustness of Self-Adaptive Robust Attention (SARA)** (2024–Present)
   Analyzed SARA's ability to identify high-level visual features for text-focused captioning under adversarial perturbation; conducted the first assessment of SARA on image captioning tasks; studied data efficiency of SARA uptraining. Course project supervised by Prof. Krzysztof Choromanski, a co-author of the original SARA paper (DeepMind).

## Publications and Posters

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| Publications | [1] Jiawen Huang, **Akshay Manglik**, Nick Dutra, Hannah Tarder-Stoll, Taylor Chamberlain, Robert Ajemian, Qiong Zhang, Kenneth A. Norman, and Christopher Baldassano. *Binding items to contexts through conjunctive neural representations with the Method of Loci.* bioRxiv Preprint, 2024.<br>[2] **Akshay Manglik***, Aman Choudhri*. *When to Think Step by Step: Computing the Cost-Performance Trade-offs of Chain-of-Thought Prompting*. Interim Preprint. 2024.<br>[3] **Akshay Manglik**. *On Bias: Moral Intuitions, Rationalizations, and Adversarial Disagreement.* Gadfly Magazine. 2022. |
| Posters | Organization for Human Brain Mapping Annual Meeting (Montreal, 2023)<br>Cornell Norman Kretzmann Undergraduate Philosophy Conference (2024)<br>Columbia Undergraduate Research Symposium (2022)<br>Columbia Undergraduate CS & Data Science Research Fair (2022) |

## Technical Skills

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| Languages | Python, Java, C, Javascript, Typescript, Bash, SQL |
| ML/AI | PyTorch, TensorFlow, Keras, CUDA, Triton, Langchain, Huggingface, Pandas |
| Cloud & Web | GCP, AWS, Firebase, BigQuery, Docker, React.js, Flask |

## Honors and Awards

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| 2021–Present | Dean's List (6 semesters), Columbia University |
| 2024 | Second Place, Columbia Healthcare Ventures Fast-Pitch Competition ($2000 prize) |
| 2024 | Ellison Scholars Shortlist |
| 2022 | Laidlaw Scholar (1 of 25 selected, provided over $8000 in funding) |
| 2022 | Data Science Institute Scholar (1 of 10 selected) |
| 2021 | National Merit Scholar |
| 2021 | National Debate Champion (NDCA Champion, TOC Semifinalist) |
| 2021 | Certificate of Special Congressional Recognition (climate change diplomacy policy work) |
| 2020 | Certificate of Special Congressional Recognition (homelessness policy work) |