Pritika Vig

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Research Interests

Studying the causal and geometric organization of representations in self-supervised models to understand how inductive biases shape interpretable features that generalize to rare and data-scarce biomedical domains.

Education

Massachusetts Institute of Technology — *MBA, Sloan School of Management* *2024 – 2026 (Expected)*

- Cross-registered in EECS coursework: Deep Learning (6.7960), Machine Learning for Healthcare (6.7930/HST.956), Modeling with Machine Learning (6.C51/6.C511)
- Healthcare Certificate: Principles and Practices of Drug Development (15.136J/HST.920J/IDS.620J), Healthcare Lab (15.777)

Dartmouth College — *BA in Computer Science* *2013 – 2017*

- Honors Thesis in motion planning

Research Experience

Dana-Farber Cancer Institute / Harvard Medical School — *Research Assistant* *June 2024 – Present*

Advisor: Dr. William Lotter, Department of Data Science

- Leading first-author project investigating where and how transformer architectures spontaneously learn biological structure, using disease progression as testbed for understanding hierarchical representation learning in self-supervised models
- Developed framework adapting diffusion pseudotime from single-cell genomics to extract disease trajectories from pathology embeddings across 5 foundation models (CONCH, MUSK, GigaPath, UNI2, DINOv2)
- Discovered that disease progression information peaks at intermediate network depths (60-75% through transformer layers) rather than final representations; using layer 16 instead of layer 24 improves downstream grading tasks by 4-12%
- Identified a trade-off between biological continuity and class separation in representation geometry, showing that intermediate transformer layers preserve transferable structure for rare diseases.

MIT Institute for Medical Engineering & Science (IMES) — *Research Assistant* *June 2024 – Present*

Advisor: Dr. Leo Anthony Celi, Computational Physiology Lab

- Designing engineering framework treating curiosity and humility as computational primitives for clinical decision support, enabling systems to learn when to seek information versus defer decisions
- Proposed benchmarking against OpenAI's HealthBench, achieving ∼40% improvement on challenging diagnostic cases through principled uncertainty quantification
- Coauthor on project on sycophancy bias in clinical LLMs: developing synthetic patient profile framework with cookie-based testing to quantify if models alter medical recommendations based on patient demographics rather than clinical evidence

Publications and Manuscripts

Accepted; Awaiting Publication

- Vig, P., [co-authors], Celi, L.A. *Engineering Epistemic Humility: A Framework for Curiosity-Driven Clinical Decision Support.* Accepted for publication in *BMJ Health & Care Informatics.*
  Contribution: Designed computational framework treating curiosity and humility as primitives; authored Engineering principles section

Under Review

- Vig, P., [co-authors], Celi, L.A. *Moving Beyond 'Can We?' to 'Should We?': An Ethics by Design Framework for Healthcare AI.* Under review at *NEJM AI.*

Contribution: Co-authored sections on epistemic humility, data-centricity, and lifecycle governance for responsible AI deployment

In Preparation

- Vig, P.*, Lotter, W. *The Emergence and Forgetting of Hierarchical Structure Across Transformer Depth: Evidence from Disease Progression in Pathology Foundation Models.* Target: ICML 2026.
  **First author.*

Professional Experience

Google — *Staff Software Engineer (promoted from SE II, SE III, Senior)* *Sept 2017 – Aug 2024*
YouTube Music Identity Team Technical Lead

- Helped grow YouTube Music from 7M to 100M users during tenure through identity and personalization features
- Led team of 4 developing user identity and sharing features while navigating privacy regulations and consent frameworks
- Launched YouTube's first-ever year-end Music Recap, seasonal recaps, and Music Profiles - driving 15x increase in sharing activity
- Collaborated with Privacy Working Group and Product Legal Counsel to design privacy-compliant solutions for music history sharing, addressing fundamental questions of user consent and value alignment
- Guided solutions through YouTube Area Tech Lead Reviews (8 most senior TLs); work adopted by YouTube Kids, Gaming, and profiles

Google Core Infrastructure Privacy — *Senior Privacy Engineer* *2021 (Rotation)*

- Trained on GDPR and Privacy by Design principles; reviewed and approved infrastructure launches for compliance
- Performed privacy audits and produced data access recommendations adopted by YouTube Search, Gmail, and Google Search

YouTube Music Track Playability — *Technical Lead* *2018-2019*

- Designed solution for critical post-launch issue affecting 2% of tracks in playlists; reduced unplayable tracks by 60% (1.2M tracks/day); deployed safely through experimental framework, A/B test results showed around 15% longer playlist consumption on pages with an unplayable vs. replaced track.

Teaching Experience

Teaching Assistant — Artificial Intelligence (CS 76), Dartmouth College (2016-2017): Led weekly office hours, graded assignments
Teaching Assistant — Software Principles and Design (CS 50), Dartmouth College (2016-2017): Led weekly recitations for 7 students, graded assignments, held office hours
Technical Team Lead, Google/YouTube Music (2020-2024): Mentored 4-6 engineers through design reviews and career development; delivered technical talks on privacy-compliant ML architectures
Software Engineering Intern Mentor, Google (2018-2020): Coached two interns through full conversion process including project design, implementation oversight, and interview preparation

Service, Mentorship & Leadership

MIT Women in EECS (2024): Mentor and gave talk to the undergrad women in CS club
Vamonos Outside (2022-2024): Mountain biking coach for Latino high schoolers to increase outdoor access
Oregon Adaptive Sports (2019-2022): Volunteer instructor for adaptive skiing programs for athletes with a variety of disabilities (blindness, cognitive, paralysis, etc)
Women@YouTube (2019-2024): Mentor for rising female engineers at YouTube, represented Google at Grace Hopper in outreach

Awards and Recognition

MIT Sloan Dean's Fellow (2024): Merit based scholarship
Scott Silver Award (2019): YouTube's recognition for exceptional technical contributions directly from VP of Engineering

YouTube Northstar Awards (2018, 2020): For embodying the values of YouTube
Launch Honors: Coachella Livestream, Google Play Library Migration, YouTube Recap

Technical Skills

Machine Learning: PyTorch, TensorFlow, Vision Transformers (CONCH, UNI, DINOv2), Self-supervised Learning, Manifold Learning
Medical AI: Whole Slide Image Analysis, Disease Progression Modeling, Survival Analysis, Histopathology Pipelines
Languages: C++, Python, Java, R
Infrastructure: Offline queue and batch processing, database management, Conda, Docker, GCP
Technical Leadership: Code review, project tracking, identifying blockers, design document generation and review, blameless postmortems