Divya Nori

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RESEARCH INTERESTS

Developing machine learning methods to design and understand biology.

Currently thinking about:

(i) Representation learning and generative modeling methods to learn from and simulate protein dynamics

(ii) Integrating sequence (language) and structure (graph) data to design therapeutically useful RNAs

(iii) Enabling zero-shot generalization for downstream biological tasks

EDUCATION

Massachusetts Institute of Technology	May 2025
M.Eng. Electrical Engineering and Computer Science	*GPA: 5.0/5.0*
Massachusetts Institute of Technology	May 2025
B.S. Electrical Engineering and Computer Science, Minor Mathematics	*GPA: 4.9/5.0*
Milton High School	May 2021
Valedictorian, U.S. Presidential Scholar	*GPA: 4.0/4.0*

COURSEWORK

Graduate CS Courses: Computer Vision, Generative AI for Biology, Sensorimotor Learning, Symmetry and its Applications to ML, TinyML & Efficient Deep Learning

Undergraduate CS Courses: Algorithms (I & II), Computational Biology, Embedded Systems, Machine Learning, Natural Language Processing, Programming (I & II), Signal Processing

Undergraduate Math/Biology Courses: Biostatistics, Calculus I & II, Differential Equations, Genetics, Linear Algebra, Organic Chemistry, Probability, Statistics

PUBLICATIONS AND PRESENTATIONS

[1] **RNAFlow: RNA Structure & Sequence Design via Inverse Folding-Based Flow Matching**   2024
Divya Nori, Wengong Jin

In *GEM Workshop at the 12th International Conference on Learning Representations (ICLR)*

Submitted to ML conference

[2] **Evaluating Zero-Shot Scoring for *In Vitro* Antibody Binding Prediction** [Paper]   2023
Divya Nori, Simon V Mathis, Amir Shanehsazzadeh

In *GenBio Workshop at the 37th Neural Information Processing Systems (NeurIPS)* [**Spotlight**]

In *Broad Institute Machine Learning for Drug Discovery Symposium*

[3] ***De Novo* PROTAC Design Using Graph-Based Deep Generative Models** [Paper, Code]   2022
Divya Nori, Connor Coley, Rocio Mercado

In *AI4Science Workshop at the 36th Neural Information Processing Systems (NeurIPS)*

In *Broad Institute Machine Learning for Drug Discovery Symposium* [**Spotlight Talk**]

[4] **AI-Based Early Detection Tool to Identify Linguistic Biomarkers of Mood Disorders** [Abstract]   2020
Divya Nori

In *9th Southeastern Pediatric Research Conference*

[5] Automated Detection System for Adolescent Prescription Stimulant Overdose [Abstract]   2020
  Divya Nori

  In *9th Southeastern Pediatric Research Conference*

SELECTED AWARDS

Eric and Wendy Schmidt Center Funded Research and Innovation Scholar	2023
D.E. Shaw Research Undergraduate Fellowship	2023
Neo Scholar Finalist	2023
MIT EECS Outstanding Undergraduate Research (UROP) Award	2023
Intel International Science & Engineering Fair Grand Award Winner	2021
Regeneron Science Talent Search Scholar	2021

EXPERIENCE

D.E. Shaw Research | ML Research Intern   May 2024 - Aug 2024
- Incoming summer intern on the ML research team, working on AI for molecular dynamics

Broad Institute of MIT and Harvard | Undergraduate Researcher   May 2022 - present
- Working on several projects at the intersection of geometric deep learning, generative modeling, and drug discovery
- **Project 1 [Ongoing]**: Developing geometric deep learning methods to generate protein conformational ensembles
- **Project 2 [Ongoing]**: Applying sequence-based ML methods to optimize RNA elements for IRES (internal ribosome entry site) function with *in vitro* validation
- **Project 3 [Jan 2023 - Jan 2024]**: Led the development of conditional flow matching methods for joint RNA structure and sequence design, conditioned on a target protein of interest

Absci | AI Research Intern   May 2023 - Sept 2023
- Trained and evaluated 8 zero-shot scoring models to predict experimental success of AI-designed antibodies, comparing sequence, apo structure, and docked complex-based methods
- Gained experience optimizing training, inference, and batched operations on a high-performance cluster

Microsoft Research | Software Engineering Intern   Jan 2023 - Feb 2023
- Contributed to a tool (ProteinHub) for researchers in the biological sciences to easily access and apply state-of-the-art deep learning models for protein engineering
- Focused on building a generative models module, involving integration of protein structure diffusion models and an autoregressive language model

MIT Scharzman College of Computing | Undergraduate Researcher   Jan 2022 - Dec 2022
- Built a graph-based deep generative model to design protein degrader molecules with predicted potency
- Applied policy-gradient reinforcement learning (RL) using a multi-objective scoring function to promote the design of structures with predicted protein degradation activity

Eli Lilly | Data Science Intern   Jan 2022 - Feb 2022
- Improved automated approach to identify and classify injection site skin reactions by bench-marking scarletred computer vision model against millions of images from Eli Lilly database

SERVICE

Teaching Assitant, Break Through Tech AI Program	Jan 2024 - present
Mentor, MIT Women in EECS	Sept 2023 - present
Reviewer, MIT Undergraduate Research Journal	Sept 2021 - present
Teaching Assistant, Intro to Deep Learning (6.S191)	Jan 2024 - Feb 2024

Academic Final Projects

[1] Conditional Diffusion-Based Generation of TCR Sequences   2023
   Bridget Li*, Rachit Mukkamala*, **Divya Nori***, Ananth Shyamal*
   18.S997 Generative AI and Biology Final Project

[2] Identification of Knowledge Neurons in Protein Language Models [Paper]   2023
   Divya Nori, Shivali Singireddy, Marina Ten Have
   Preprint, 6.8611 Natural Language Processing Final Project

[3] CryoSphere: SO(3)-Equivariant Method for Cryo-EM Pose Estimation [Poster, Code] 2023
   Dev Chheda*, **Divya Nori***
   Presented at Boston Symmetry Day at MIT, 6.S966 Symmetry and ML Final Project