

# Shilpa Nadimpalli Kobren

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## Education

- 2018 **Ph.D. in Computer Science** • Princeton University  
*Thesis:* Detecting and Analyzing Variation in Protein Interaction Interfaces  
*Advisor:* Mona Singh
- 2013 **M.Sc. in Computer Science** • Princeton University
- 2011 **B.Sc. in Biology & Computer Science, summa cum laude** • Tufts University  
*Thesis, Awarded Highest Honors:* Correcting Protein Multiple Structural Alignments by Sequence Peeking  
*Advisor:* Lenore Cowen

## Awards & Honors

- 10/2021–04/2022 Amazon Web Services (AWS) Cloud Credit for Research Award *totalling \$32,000*
- 10/2021 Outstanding Postdoctoral Researcher *awarded annually to one member of each department at Harvard University*
- 08/2015 **Siebel Scholar, Class of 2016** *awarded annually for academic excellence and demonstrated leadership to 93 top students from the world's leading graduate schools*
- 09/2011–09/2015 **NSF Graduate Research Fellowship** *for graduate study in STEM disciplines*
- 09/2011–09/2015 **Princeton Gordon Wu Fellowship** *for engineering graduate study*
- 05/2011 **Tufts James Schmolze Award** *for top undergraduate achievement in computer science*
- 05/2010 **Google Anita Borg Memorial Scholarship** *for women in computer science*
- 08/2007–05/2011 Tufts Neubauer Scholarship *for aptitude in research; grants to fully cover all four years of undergraduate student loans (1 in 10 of ~1500)*
- 04/2011 Tufts Class of 1882 Prize Scholarship *for intellectual leadership (1 in 4 of ~5000)*
- 04/2010 Tufts Audrey Butvay Gruss Award *for scientific achievement (1 in 4 of ~5000)*
- 06/2009–10/2009 CRA-W/CDC Distributed Research Experiences for Undergraduates Fellowship
- 09/2008–05/2009 CRA-W Multidisciplinary Research Opportunities for Women Fellowship
- 06/2008–09/2008 NSF/NIH Southern California Bioinformatics Summer Institute Fellowship
- 05/2006 Massachusetts State Science Fair, 1st Place Award

## Publications

- Under Review **SN Kobren\***, M Moldovan\*, RM Reimers, D Traviglia, X Li, D Barnum, A Veit, RI Corona, GVC Neto, J Willett, M Berselli, W Ronchetti, SF Nelson, JA Martinez-Agosto, R Sherwood, JB Krier, IS Kohane, Undiagnosed Diseases Network, SR Sunyaev. "Joint, multifaceted genomic analysis enables diagnosis of diverse, ultra-rare monogenic presentations." *bioRxiv*.  
E Alsentzer\*, MM Li\*, **SN Kobren**, Undiagnosed Diseases Network, IS Kohane, M Zitnik. "Deep learning for diagnosing patients with rare genetic diseases." *medRxiv*.  
L Fitzsimmons, B Beaulieu-Jones†, **SN Kobren**†. "Phenotypic overlap between rare disease patients and variant carriers in a large population cohort informs biological mechanisms." *medRxiv*.  
R Yin, A Gutierrez, IS Kohane, SR Sunyaev, **SN Kobren**†, P Avillach†. "VarPPUD: Variant post prioritization for undiagnosed genetic disorders." *medRxiv*.

- In Preparation A Gutierrez, A Serret-Larmande, R Yin, S Makwana, T DeSain, N Chu, JP Stedman, D Pillion, JC Lyons, **SN Kobren**, D Traviglia, C Esteves, K LeBlanc, E Hughes, Undiagnosed Diseases Network, S Churchill, SR Sunyaev, AT McCray, IS Kohane, P Avillach. "A patient-centric information commons for a national undiagnosed diseases network."
- 2024 S Fazal, M Danzi, I Xu, **SN Kobren**, S Sunyaev, C Reuter, S Marwaha, MT Wheeler, E Dolzhenko, F Lucas, S Wuchty, M Tekin, S Zuchner, V Aguiar-Pulido. "RExPRT: a machine learning tool to predict pathogenicity of tandem repeat loci." *Genome Biol*, 25: 39.
- S Chen, ALM Tan, C Perry, S Churchill, M Vella, J Mao, V Viswanadham, **SN Kobren**, IS Kohane. "Polygenic risk scores for autoimmune related diseases are significantly different and skewed in cancer exceptional responders." *npj Precision Oncology*.
- 2023 E Alsentzer, SG Finlayson, MM Li, **SN Kobren**<sup>†</sup>, IS Kohane<sup>†</sup>. "Simulation of undiagnosed patients with novel genetic conditions." *Nat Commun*, 14: 6403.
- RJ Tinker, L Bastarache, KM Ezell, **SN Kobren**, C Esteves, JA Rosenfeld, EF Macnamara, R Hamid, JD Cogan, D Rinker, S Mukharjee, I Glass, K Dipple, JA Phillips III, Undiagnosed Diseases Network (2023). "The contribution of mosaicism to genetic diseases and de novo pathogenic variants." *American Journal of Medical Genetics Part A*, 191: 2482–2492.
- 2021 **SN Kobren**, D Baldridge, M Velinder, JB Krier, K LeBlanc, C Esteves, BN Pusey, S Züchner, E Blue, H Lee, A Huang, L Bastarache, A Bican, J Cogan, S Marwaha, A Alkelai, DR Murdock, P Liu, DJ Wegner, AJ Paul, Undiagnosed Diseases Network, SR Sunyaev, IS Kohane (2021). "Commonalities across computational workflows for uncovering explanatory variants in undiagnosed cases." *Genetics in Medicine*. 23: 1075–1085.
- BK Beaulieu-Jones, C Darabos, D Kim, A Verma, **SN Kobren** (2021). "Innovative methodological approaches for data integration to derive patterns across diverse, large-scale biomedical datasets." *Pac Symp Biocomput*, 26: 256–260.
- SN Kobren** (2021). "How medical mysteries push back the frontier of genomics knowledge." *UDN PEER Newsletter*, Summer 2021.
- 2020 **SN Kobren**, B Chazelle, M Singh. (2020). "PertInInt: An integrative, analytical approach to rapidly uncover cancer driver genes with perturbed interactions and functionalities." *Cell Systems*. 11: 63–74.
- SN Kobren**, BK Beaulieu-Jones, C Darabos, D Kim, A Verma (2020). "Ongoing challenges and innovative approaches for recognizing patterns across large-scale, integrative biomedical datasets." *Pac Symp Biocomput*, 25: 286–294.
- 2019 **SN Kobren**, M Singh. (2019). "Systematic domain-based aggregation of protein structures highlights DNA-, RNA- and other ligand-binding positions." *Nucleic Acids Research*. 47: 582–593.
- 2015 **S Nadimpalli**, AV Persikov, M Singh. (2015). "Pervasive variation of transcription factor orthologs contributes to regulatory network divergence." *PLoS Genetics*. 11: e1005011.
- 2012 N Daniels, **S Nadimpalli**, L Cowen. (2012). "Formatt: Correcting protein structural alignments by incorporating sequence alignment." *BMC Bioinformatics*. 13: 259–266.
- 2011 **S Nadimpalli**\*, N Daniels\*, L Cowen. (2011). "Formatt: Correcting protein structural alignments by sequence peeking." *Proceedings of the 2011 ACM Conference on Bioinformatics, Computational Biology, and Biomedicine*. 2: 315–319.
- 2009 J Rieffel, F Sauders, **S Nadimpalli**, H Zhou, S Hassoun, J Rife, B Trimmer. (2009). "Evolving soft robotic locomotion in PhysX." *Proceedings of the 2009 ACM Conference on Genetic and Evolutionary Computation*. 11: 2499–2504.

## Research & Work Experience

- 08/2018 – Present **Postdoctoral Research Fellow**, Harvard Medical School • Boston, MA  
Developing computational approaches to identify recurrent disease etiologies from cohort-level genomic and clinical data to improve diagnoses of rare diseases under Drs. Isaac S. Kohane and Shamil R. Sunyaev

- 03/2012–06/2018 **Graduate Research Assistant**, Princeton University • *Princeton, NJ*  
*“Detecting and Analyzing Variation in Protein Interaction Interfaces”*  
 Investigated the evolution, natural variation, and disease-related mutation of cellular networks through analysis of protein interaction interfaces under Prof. Mona Singh
- Undergraduate Research Assistant**, Tufts University • *Medford, MA*
- 01/2010–05/2011 *“Formatt: Correcting Protein Multiple Structural Alignments by Sequence Peeking”*  
 Improved the Matt protein structural aligner by incorporating a sequence alignment correction step and validating using objective measures under Prof. Lenore J. Cowen
- 09/2008–05/2009 *“Modeling the Neuro-Mechanical Control of a Soft-Tissue Organism”*  
 Evolved a solution representing the firing of neurons for muscle contraction using genetic algorithms to successfully elicit motion in a SoftBot under Prof. Soha Hassoun
- 06/2009–10/2009 **Summer Intern, Bioinformatics Dept**, Virginia Tech • *Blacksburg, VA*  
*“Cataloging Animal Retrocopies for Retrotransposon Model”*  
 Developed a genome annotation independent algorithm to identify and classify retrocopies and chimeric genes given a transcriptome under Prof. Liqing Zhang
- 06/2008–09/2008 **Summer Intern, Biochemistry Dept**, University of California, Los Angeles • *Westwood, CA*  
*“Discovery of Novel Metabolic Types of Bacterial Microcompartments”*  
 Implemented a pipeline to analyze oceanic metagenomic sequencing data for bacterial microcompartment (BMC) shell proteins to identify potentially novel metabolic BMC types under Prof. Todd Yeates
- 05/2007–08/2007 **Summer Intern, Preclinical Dept**, Shire Pharmaceuticals • *Cambridge & Lexington, MA*  
 Set up a secure database containing clinical and research reports for drugs in production or under testing.
- 06/2006–09/2006 **Summer Intern, Microbiology Dept**, Univ. of Massachusetts Medical School • *Worcester, MA*  
*“Identification of Genes Involved in Expansion of Chromosomal Repeat in E. Coli”*  
 Developed a series of knockout bacterial strains and tested viability of bacteria and amplification of a specific chromosomal repeat under Prof. Anthony Poteete

## Teaching & Advising Experience

- 08/2024–11/2024 **Course Co-Director**, Harvard Medical School • *Boston, MA*  
 (Upcoming) Design and lead a new 7-week elective course for Master’s Program in Biomedical Informatics: *BMI711: Integrative Analyses for Rare Genetic Disease Diagnostics*
- 01/2022–05/2024 **Master’s Capstone Project Adviser**, Harvard Medical School • *Boston, MA*  
 Primary adviser for year-long capstone projects for student in the School of Public Health and for student in the Department of Biomedical Informatics
- 03/14/2024 **Instructor for CME Accredited Course: Long-Read Sequencing: Diagnosing the Undiagnosed through Comprehensive Clinical Genetic Testing**, American College of Medical Genetics (ACMG) Annual Clinical Genetics Meeting • *Toronto, Canada*  
 Lecture introducing long-read sequencing technologies and the diagnostic potential over traditional sequencing technologies
- 05/2023, 05/2024 **Instructor for CME Accredited Course: Evaluation of Undiagnosed and Rare Conditions**, Harvard Medical School • *Boston, MA*  
 Gave 1-hour lecture on clinical genomic sequencing and research analytic pipelines
- 11/15/2018 **Guest Lecturer in Computational Biology**, Tufts University • *Medford, MA*  
 Gave 1-hour lecture on DNA motif finding algorithms to undergraduate and graduate students in *CS167*.
- 01/2016–09/2017 **Coadviser for First-Year Graduate Students**, Princeton University • *Princeton, NJ*  
*Fall 2016, Spring 2016 & Spring 2017* Coadvised three Ph.D. students in Computational Biology and Computer Science on separate projects related to protein domains, protein binding and cancer
- 06/2013–07/2013 **Coadviser for Undergraduate Students**, Princeton University • *Princeton, NJ*  
*Summer 2013* Coadvised three undergraduates on a summer project through the Summer Programming Experiences program to build a secure voting mobile application

- 09/2012–05/2013 **Assistant Instructor**, Princeton University • *Princeton, NJ*  
*Fall 2012 & Spring 2013* Taught precepts twice weekly for *COS126: General Computer Science*, held office hours (~10 hours/week), graded assignments and proctored midterm and final exams.  
 \*Top rated (4.5/5 on average) by students for all precepts taught over both semesters.
- 09/2009–05/2010 **Teaching Assistant**, Tufts University • *Medford, MA*  
*Fall 2009 & Spring 2010* Attended lectures, assisted in labs, held office hours (~10-18 hours/week) and graded assignments for two courses *CS40: Machine Structure and Assembly Language Programming* and *CS80: Programming Languages*.
- 02/2009–06/2009 **High School Bioinformatics Instructor**, Somerville High School • *Somerville, MA*  
 Analyzed soil metagenomic data to discover new microbes and led four spring seminars for students about gene sequencing and alignment algorithms. Project funded via an HHMI ARRAYS grant.

## Presentations

### Invited Talks

- 02/20/2024 Sampson Lab for Kidney Genomics at Boston Children's Hospital, *Boston, MA*  
 02/08/2024 Medical and Population Genetics (MPG) Seminar at the Broad Institute, *Cambridge, MA*  
 08/10/2023 Undiagnosed Diseases Network (UDN) Grand Rounds, *Boston, MA*  
 04/25/2023 American Academy of Neurology Child Neurology Section Spotlight, *Boston, MA*  
 10/24/2022 St. Jude Pediatric Translational Neuroscience Initiative Ultrarare Disease Workshop, *Memphis, TN*  
 09/21/2021 Broad Institute's Statistical Genetics Seminar Series, *Virtual Meeting*  
 09/10/2021 International Session of Undiagnosed & Rare Diseases at China Rare Diseases Summit, *Virtual Meeting*  
 08/13/2021 Tufts University Bioinformatics & Computational Biology (BCB) Research Group, *Virtual Meeting*  
 08/04/2021 Stanford Center for Undiagnosed Diseases Seminar Series, *Virtual Meeting*  
 07/14/2021 Undiagnosed Diseases Network Annual In-Person Meeting, *Virtual Meeting*  
 07/13/2021 Boston Children's Hospital Seminar Series, *Virtual Meeting*  
 06/23/2021 Illumina Clinical Bioinformatics Workshop, *Virtual Conference*  
 12/05/2019 Quantitative and Computational Biology Colloquium at the Univ. of Southern California, *Los Angeles, CA*  
 11/14/2019 Undiagnosed Diseases Network (UDN) Grand Rounds, *Boston, MA*  
 11/11/2019 Janelia Women in Computational Biology Conference at HHMI-Janelia Research Campus, *Ashburn, VA*  
 10/25/2018 'Rising Stars in Computer Science' Symposium at Tufts University, *Medford, MA*  
 03/08/2018 Open Insights Seminar Series at Harvard Medical School, Dept. of Biomedical Informatics, *Boston, MA*  
 01/09/2018 Seminar at the Flatiron Institute, Center for Computational Biology (CCB), *New York City, NY*  
 11/03/2017 Lewis-Sigler Institute for Integrative Genomics 2017 Retreat, *Princeton, NJ*  
 09/26/2017 Data Science Seminar Series at the University of Massachusetts, *Amherst, MA*  
 09/13/2017 'Rising Stars in Data Science' Symposium at the University of Chicago, *Chicago, IL*  
 01/06/2017 Princeton Area Alumni Association First Friday Series, *Princeton, NJ*  
 01/06/2016 Icahn Institute Think & Drink Symposium, *Princeton, NJ*

### Platform Presentations

- 09/29/2023 Critical Assessment of Genome Interpretation (CAGI)\*\* Workshop, *Boston, MA*  
 10/20/2021 American Society of Human Genetics (ASHG) Annual Meeting, *Virtual Conference*  
 08/02/2017 NY Area Meeting in Quantitative Biology, *Cold Spring Harbor, NY*  
 04/02/2011 Tufts 13th Annual Undergraduate Research Symposium, *Medford, MA*

### Posters

- 11/03/2023 American Society of Human Genetics (ASHG) Annual Meeting, *Washington, DC*  
 07/10/2023 Gordon Research Conference on Human Genetics & Genomics, *Waterville Valley, NH*  
 11/15/2015 RECOMB/ISCB Conference on Regulatory and Systems Genomics, *Philadelphia, PA*  
 03/20/2014 Systems Biology Meeting: Global Regulation of Gene Expression, *Cold Spring Harbor, NY*  
 04/09/2011 3rd Annual New England Undergraduate Computing Symposium, *Cambridge, MA*  
 10/09/2009 Midwest Women in Computing Conference, *Chicago, IL*

### Panels

- 11/02/2023 “The Role of AI & Data Technology in Overcoming the Challenges of Rare Diseases” at the North America Rare Disease Summit, *New York City, NY*
- 07/15/2021 “Identifying and engaging the patient” at St. Jude Pediatric Translational Neuroscience Initiative Ultrarare Diseases Workshop, *Memphis, TN*
- 07/15/2021 “Doctoral Career Trajectories” at Harvard DBMI Summer Institute in Biomedical Informatics, *Boston, MA*
- 01/06/2021 “Pattern Recognition in Biomedical Data for Discovery” at PSB, *Virtual Conference*
- 07/16/2020 “Doctoral Career Trajectories” at Harvard DBMI Summer Institute in Biomedical Informatics, *Boston, MA*
- 01/06/2020 “Pattern Recognition in Biomedical Data: Challenges in Putting Big Data to Work” at PSB, *Waimea, HI*
- 11/11/2019 “Challenges and Opportunities with Emerging Technologies in Molecular and Cell Biology” at Janelia Women in Computational Biology Conference, *Ashburn, VA*
- 07/23/2019 “Doctoral Career Trajectories” at Harvard DBMI Summer Institute in Biomedical Informatics, *Boston, MA*
- 08/22/2017 “Women in Bioinformatics” at ACM Conf. on Bioinformatics, Comp Bio & Biomedicine, *Boston, MA*
- 10/02/2015 “Pursuing Graduate Studies in Computer Science” at Princeton Univ. Computer Sci. Dept., *Princeton, NJ*
- 03/28/2013 “Maximizing the Utility of Office Hours” at Princeton University McGraw Teaching Center, *Princeton, NJ*
- 04/09/2011 “Graduate School Application Process and Visit Experience” at 3rd Annual New England Undergraduate Computing Symposium, *Boston, MA*

## Service

### Conferences

- 07/2024 ISMB 2024 referee, *Montreal, Canada*
- 01/2019–01/2021 Pacific Symposium on Biocomputing 2020 & 2021, Session Co-Chair and referee, *Big Island of Hawaii*
- 12/2018 Machine Learning for Health (ML4H) at NeurIPS 2018, referee, *Montreal, Canada*
- 01/2017–08/2017 ACM Bioinformatics & Computational Biology 2017 Student Activity Co-Chair and referee, *Boston, MA*
- 05/2017, 05/2019 RECOMB 2017 & 2019 referee, *Hong Kong & Washington, DC*
- 07/2010, 07/2014 ISMB 2010 & 2014 Student Volunteer and referee, *Boston, MA*

### Leadership

- 02/2024–Present Undiagnosed Diseases Network, Tool Building Coalition Working Group, *Chair*
- 10/2018–02/2024 Undiagnosed Diseases Network, Tool Building Coalition Working Group, *Primary Organizer*
- 05/2012–02/2015 Princeton Graduate Student Government, *Computer Science Representative, Events Board Member*
- 07/2012–05/2014 Princeton Jewish Graduate Students and Young Professionals, *President*

### Mentoring and Outreach

- 08/2023–09/2023 CAGI Salon for trainees, *Organizer and participant*
- 01/2019–05/2020 Harvard Women in STEM (WiSTEM) Mentoring Program, *Undergraduate Student Mentor*
- 09/2011–05/2018 Princeton Graduate Women in Science and Engineering, *Mentoring Program Participant*
- 08/2011–Present Tufts Alumni Admissions Program, *Applicant Interviewer*
- 09/2008–05/2011 Tufts Admissions Office, *April Open House Host, Voices Host, Speaker at Engineering Open House*
- 09/2007–05/2011 Tufts Association for Computing Machinery, Women, *Mentor & Outreach Contact*