Meenakshi Khosla

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Education

Cornell University — *Ithaca, NY*
PhD in Electrical and Computer Engineering, Minor in Applied Statistics — *Aug 2017 - Aug 2021*

- Grade Point Average: 4.0
- **Courses:** Machine Learning Theory, Statistical Distances for Machine Learning, Computer Vision, Bayesian Statistics and Data Analysis, Introduction to Neural Engineering, Machine learning for Data Science, Machine learning with Biomedical Data, Statistical Principles

Indian Institute of Technology, Kanpur, India — *Kanpur, India*
BTech -MTech Dual Degree in Electrical Engineering — *Jul 2011 - Jun 2016*

- Cumulative Performance Index: 9.5/10 (BTech), 10/10 (MTech)

Research Interests

Computational Neuroscience, Machine Intelligence, Computer Vision, Neuroimaging, functional MRI, Biomedical Image Analysis

Professional Experience

Massachusetts Institute of Technology — *Cambridge, MA*
Postdoctoral associate, Advised by Prof. Nancy Kanwisher — *Sep 2021 - Present*
"Using data-driven computational approaches to understand human vision"

Qualcomm, Autonomous Driving — *San Diego, CA*
Machine Learning Intern — *Jun 2018 - Aug 2018*
"Developing & optimizing energy-efficient neural networks for object detection & lane segmentation"

Yale School of Medicine — *New Haven, CT*
Postgraduate research associate, Advised by Prof. Hal Blumenfeld — *Jun 2016 - Dec 2016*
"Signal processing for analyzing intracranial EEG data to study human normal consciousness"

Cornell University — *Ithaca, NY*
Summer Intern, Advised by Prof. Rajit Manohar — *May 2014 - Jul 2014*
"Pareto-optimality for ultra low-voltage design of WCHB QDI asynchronous circuits"

Selected Publications

Meenakshi Khosla, N Apurva Ratan Murty & Nancy Kanwisher. "A Highly Selective Response to Food in Human Visual Cortex Revealed by Hypothesis-Free Voxel Decomposition." *Current Biology*, 2022. [pdf]

Meenakshi Khosla, Keith Jamison, Amy Kuceyeski & Mert R. Sabuncu. "Characterizing the ventral visual stream with response-optimized encoding models." *Neural Information Processing Systems (NeurIPS)*, 2022. **Oral**

Meenakshi Khosla, Gia H. Ngo, Keith Jamison, Amy Kuceyeski & Mert R. Sabuncu. "Cortical response to naturalistic stimuli is largely predictable with deep neural networks." *Science Advances*, 2021.[pdf]

Meenakshi Khosla, Gia H. Ngo, Keith Jamison, Amy Kuceyeski & Mert R. Sabuncu. "Neural encoding with visual attention." *Neural Information Processing Systems (NeurIPS)*, 2020. **Oral** [pdf]

Meenakshi Khosla, Gia H. Ngo, Keith Jamison, Amy Kuceyeski & Mert R. Sabuncu. "A shared neural encoding model for the prediction of subject-specific fMRI response." *MICCAI*, 2020. **Oral** [pdf]

Meenakshi Khosla & Leila Wehbe. "High-level visual areas act like domain-general filters with strong selectivity and functional specialization." *(Under revision at Nature Communications)* 2022.[pdf]

Gia H. Ngo, **Meenakshi Khosla**, Keith Jamison, Amy Kuceyeski & Mert R. Sabuncu. "From Connectomic to Task-evoked Fingerprints: Individualized Prediction of Task Contrasts from Resting-state Functional Connectivity." *MICCAI*, 2020. [pdf]

Nancy Kanwisher, **Meenakshi Khosla** & Katharina Dobs. "Using Artificial Neural Networks to ask Why Questions of Minds and Brains." *Trends in Neurosciences* 2023.

Meenakshi Khosla, Keith Jamison, Amy Kuceyeski and Mert R. Sabuncu. "Ensemble learning with 3D convolutional neural networks for connectome-based prediction." *NeuroImage*, 2019. [pdf]

Meenakshi Khosla, Keith Jamison, Gia H. Ngo, Amy Kuceyeski and Mert R. Sabuncu. "Machine learning in resting-state fMRI analysis." *Magnetic resonance imaging*, 2019 (Special issue on Machine Learning). [pdf]

Gia H. Ngo, **Meenakshi Khosla**, Keith Jamison, Amy Kuceyeski & Mert R. Sabuncu. "Predicting Individual Task Contrasts From Resting-state Functional Connectivity using a Surface-based Convolutional Network". *NeuroImage*, 2022. [pdf]

Zijin Gu, Keith Jamison, **Meenakshi Khosla**, Emily Allen, Yihan Wu, Thomas Naselaris, Kendrick Kay, Mert R. Sabuncu & Amy Kuceyeski. "NeuroGen: activation optimized image synthesis for discovery neuroscience." *NeuroImage*, 2022. [pdf]

Wendy X. Herman, Rachel Williamson Smith, Sharif I. Kronemer, Rebecca E. Watsky, William C. Chen, Leah M Gober, George J Touloumes, **Meenakshi Khosla**, *et al.* "A Switch and Wave of Neuronal Activity in the Cerebral Cortex During the First Second of Conscious Perception". *Cerebral Cortex*, 2018. [pdf]

Meenakshi Khosla, Sravya Rao and Shilpi Gupta. "Polarons Explain Luminescence Behavior of Colloidal Quantum Dots at Low Temperature." *Sci Rep*, 2018. [pdf]

Neelesh Kumar Vij, **Meenakshi Khosla** & Shilpi Gupta. "Mutli-variable Optimization of Cooling of Mechanical Mode assisted by Three-level System." *Laser Science*, 2021. [pdf]

Selected Abstracts & Workshop proceedings

Meenakshi Khosla, N Apurva Ratan Murty, Elizabeth Ann Mieczkowski and Nancy Kanwisher. "A Highly Selective Neural Response to Food in Human Visual Cortex Revealed by Hypothesis-Free Voxel Decomposition." *Cognitive Computational Neuroscience (CCN)*, 2022.

Meenakshi Khosla, N Apurva Ratan Murty and Nancy Kanwisher. "Data-driven component modeling reveals the functional organization of high-level visual cortex." *Vision Sciences Society Annual Meeting (VSS)*, 2022.

Meenakshi Khosla and Leila Wehbe. "Hypothesis-neutral response-optimized models of higher-order visual cortex reveal strong semantic selectivity." *Computational and Systems Neuroscience (COSYNE)*, 2022.

Alex Abate, Elizabeth Mieczkowski, **Meenakshi Khosla**, James DiCarlo, Nancy Kanwisher, N Apurva Ratan Murty. "Computational models recapitulate key signatures of face, body and scene processing in the FFA, EBA and PPA." *Vision Sciences Society Annual Meeting (VSS)*, 2022.

Meenakshi Khosla, Keith Jamison, Amy Kuceyeski and Mert R. Sabuncu. "3D convolutional neural networks for classification of functional connectomes." *Deep Learning in Medical Image Analysis workshop at MICCAI*, 2018. [pdf]

Meenakshi Khosla, Keith Jamison, Amy Kuceyeski and Mert R. Sabuncu. "Detecting abnormalities in resting-state dynamics: An unsupervised learning approach." *Machine learning in medical imaging workshop at MICCAI*, 2019. [pdf]

Meenakshi Khosla, Gia H. Ngo, Keith Jamison, Amy Kuceyeski and Mert R. Sabuncu. "Towards holistic encoding models for multi-modal naturalistic stimuli." *Organization for Human Brain Mapping (OHBM) Annual Meeting*, 2020.

Meenakshi Khosla, Keith Jamison, Amy Kuceyeski and Mert R. Sabuncu. "Functional connectivity based diagnosis of autism: a convolutional neural network based approach." *Resting State and Brain Connectivity Conference*, 2018.

Zijin Gu, Keith Jamison, **Meenakshi Khosla**, Mert Sabuncu and Amy Kuceyeski. "Identification and synthesis of images that maximize activation in individual regions within the human visual cortex." *Organization for Human Brain Mapping (OHBM) Annual Meeting*, 2021.

Conference & Invited Talks

Towards Data-Driven Modeling in Large-scale Naturalistic Neuroscience *Jan-Mar 2023*

Duke Biostatistics and Biomedical Informatics Seminar Series

CBMM Research Meeting

Harvard Kempner Special Seminar Series

Georgia Tech CSE Seminar

Cornell BME Seminar

York University Psychology Seminar

UCSD Cognitive Sciences Seminar

UC Irvine Cognitive Sciences Seminar

Characterizing the Ventral Visual Stream with Response-Optimized Neural Encoding Models *Dec 2022*

Oral Presentation, NeurIPS

A highly selective neural response to food in visual cortex revealed by hypothesis-free voxel decomposition *Nov 2022*

Presentation, McGovern Institute Scientific Advisory Board Meeting

Data-driven component modeling reveals the functional organization of high-level visual cortex *May 2022*

Oral Presentation, VSS 2022

Hypothesis-neutral response-optimized models of higher-order visual cortex reveal strong semantic selectivity *Dec 2021*

Oral Presentation, Neuromatch Conference 4.0

Bridging cognitive neuroimaging and computational neuroscience with holistic predictive models *Oct 2021*

Medical Imaging Seminar Series, Johns Hopkins University. Host: Archana Venkataraman

Predicting Cortical Response to Naturalistic Stimuli using Deep Learning *Apr 2021*

Biomedical Image Computing Seminar, ETH Zurich. Host: Ender Konukoglu

Towards holistic neural encoding models for multi-modal naturalistic stimuli *Feb-Jun 2021*

Boston Learning in Medical Image Analysis Seminar, MIT and MGH. Host: Adrian Dalca

Visual Inference Lab, Columbia University. Host: Nikos Kriegeskorte

Princeton Neuroscience Institute. Host: Ken Norman

Lightning talk, Unifying Neuroscience and AI in Quebec (UNIQUE) - Student Symposium

Neural encoding with visual attention *Dec 2020*

Oral presentation, NeurIPS.

Shared neural encoding for the prediction of subject-specific fMRI response *Oct 2020*

Oral presentation, MICCAI.

Teaching & Professional Activities

2022 **Instructor**, ABCD-ReproNim AI/ML Course
2022 **Teaching Assistant and Guest lecturer**, 9.13 The Human Brain at MIT
2019, 2020 **Teaching Assistant and Guest lecturer**, ECE4250 Digital Signal and Image processing at Cornell University
2021- **Review Editor**, Frontiers in Neuroimaging
2022 **Highlighted Reviewer**, ICLR
2020-22 **Conference Reviewer**, MICCAI, MIDL, ICML, ICLR, NeurIPS
2018- **Journal Reviewer**, NeuroImage, Frontiers, Aperture, IEEE TMI, Nat. Comm., Comm. Biology
2020 **Co-organizer**, Machine Learning in Medicine Seminar Series at Cornell University
2020 **Co-organizer**, Breakout session on "Machine Learning for Neuroimaging" at WiML, ICML
2020 **Content Reviewer**, Neuromatch Academy
2016 **Teaching Assistant**, Microelectronics at IIT Kanpur
2013-14 **Mentorship Manager**, Avanti Core Team, IIT Kanpur
2012-14 **Mentor**, High-school STEM students as part of the **Avanti Team**, IIT Kanpur
2012-13 **Student Guide**, Counselling Service, IIT Kanpur

Fellowships & Awards

2021 **Postdoc-NeT-AI Fellow**, DAAD *Germany*
2020 **Outstanding PhD TA Award**, Cornell ECE *U.S.*
2020 **Student Travel Award**, MICCAI *U.S.*
2017 **Christen Fellowship**, Cornell University *U.S.*
2015 **Gargi Maitreyi Lilavati Award**, awarded to female students with highest CGPA, IIT Kanpur *India*
2012-15 **Academic Excellence Award**, distinctive achievements, IIT Kanpur *India*
2012 **Todai-IIT Undergraduate Student Scholarship for Academic Excellence**, University of Tokyo *Japan*
2011 **KVPY Scholarship**, Department of Science & Technology, Government of India *India*

Selected Press Coverage & Public outreach

Decoding the brain *Oct 2022*

Talk at the Cambridge Science Festival, MIT Museum

MIT scientists discover neurons that light up when we see images of food *Oct 2022*

Episode at CBS Boston

Neurons that light up when we see images of food *Sep 2022*

Fireside chat at the Quantum Photonics Clubhouse

These neurons have food on the brain *Sep 2022*

Popular press article at the MIT Press

Brain scran: pictures of food appear to trigger specific neurons, scientists find *Sep 2022*

Popular press article at The Guardian

Is that a piece of cake? Here's how your brain knows something is food *Sep 2022*

Popular press article at Inverse

A Special Part of the Brain Lights Up When We See Food *Sep 2022*

Popular press article at WebMD

Movies, music and pictures can train synthetic brain *Jun 2021*

Popular press article at the Cornell Chronicle

Skills

Language Python, C++, MATLAB, LaTeX
Frameworks Tensorflow, Keras, Pytorch, Nilearn, Numpy, Scipy, Pandas

References

Nancy Kanwisher Professor, Department of Brain and Cognitive Sciences, MIT. Contact: ngk@mit.edu
Mert Sabuncu Professor, School of Electrical and Computer Engineering, Cornell University. Contact: msabuncu@cornell.edu
Leila Wehbe Assistant Professor, Machine Learning Department, Carnegie Mellon University. Contact: lwehbe@cmu.edu
Amy Kuceyeski Adjunct Associate Professor, Department of Statistics & Data Science, Cornell University. Contact: amk2012@med.cornell.edu