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Rajani Raman, PhD

Summary

A neuroscientist with 10+ years of research experience in investigating the computational mechanism of the visual system using machine learning methods and artificial neural networks. A proven track record of publications, programming, problem-solving, and communication. A quick learning, self-motivated individual that can easily integrate into interdisciplinary collaborative work and work environment.

Research Experience

2020– Present **Postdoctoral Researcher** , *KU Leuven*, Leuven, Belgium
Investigating how does the brain process the visual information from the body-movements, using the tools of machine learning, fMRI, and electrophysiology in macaque (with Prof. Rufin Vogels and other collaborators in an ERC Synergy project)

2017 – 2020 **Research Scientist**, *ATR Cognitive Mechanism Labs*, Kyoto, Japan
Assessed different deep neural networks as a model of face processing against the observed tuning properties of neurons in the face patches of macaques (with Dr. Haruo Hosoya)

2011 – 2017 **PhD Researcher**, *Saha Institute of Nuclear Physics*, Kolkata, India
Investigated computational mechanism of the filling-in phenomenon at the blind spot and associated properties in the framework of predictive coding model of natural images (under supervision of Prof. Sandip Sarkar)

Research Interests

Visual recognition and perception | Predictive coding and Bayesian inference | Deep learning | Natural scene statistics

Skills

Technical: Machine and Deep learning | Data and Visual analytics | Coding in Matlab and Python
Soft: Problem solving | Adaptability | Critical thinking | Teamwork | Communication | Empathy

Publications

- Murris S, Arsenault J, **Raman R**, Vogels R, Vanduffel W. Electrical stimulation of the macaque ventral tegmental area drives category-selective learning without attention. *Neuron*, 2021.
- **Raman R**, Hosoya H. Convolutional neural networks explain tuning properties of anterior, but not middle, face-processing areas in macaque inferotemporal cortex. *Communications biology*, 2020.
- **Raman R**, Sarkar S. Significance of Natural Scene Statistics in Understanding the Anisotropies of Perceptual Filling-in at the Blind Spot. *Scientific Reports*, 2017.
- **Raman R**, Sarkar S. Predictive Coding: A Possible Explanation of Filling-In at the Blind Spot. *PLOS ONE*, 2016

Selected Conference Presentations

- M. Beghella Bartoli, ***Raman R**, N. Taubert, Y. Zafirova, B. De Gelder, M. Giese, R. Vogels. Mapping dynamic body patches in macaque inferotemporal cortex. SfN Annual Meeting, 2021 (online). *Presenting author
- **Raman R**, Hosoya H. Does CNN explain tuning properties of macaque face-processing system? CCN, 2019, Berlin, Germany.
- **Raman R**, Hosoya H. Evaluating CNNs as a model of face processing network of the macaque, 42^{nd} JNS Annual Meeting, 2019, Toki Messe, Japan. (talk)
- **Raman R**, Hosoya H. Does CNN explain the properties of the middle face patch area of primate? SfN Annual Meeting, 2018 , San Diego, CA.
- **Raman R**, Sarkar S. Understanding Anisotropies Related to the Filling-In at the Blind Spot in the Light of Natural Image Statistics, JNNS-2017, Kitakyusyu, Japan.
- **Raman R**, Sarkar S. Studies on filling-in across blind spot in the light of hierarchical predictive coding of natural images, ICMCB 2015, IIT Kanpur, India. (talk)

Schools

- Summer School on Computational Approach to Memory and Plasticity, 2014, NCBS, Bangalore, India.
- Cold Spring Harbor Asia Summer School: Computational and Cognitive Neuroscience, 2013, Beijing, China.

Education

2011-2017 **PhD**, *Saha Institute of Nuclear Physics* , Kolkata, India
Thesis: Computational mechanism of filling-in in the visual system

2010-2011 **Pre-doctoral training**, *Saha Institute of Nuclear Physics*, Kolkata, India
Specialization: Computational vision and neuromorphic design

2007-2009 **MSc (Physics)**, *Patna University*, Patna, India
Specialization: Electronics and Instrumentation

Scholarships

- Senior research fellowship, Department of Atomic Energy, Govt. of India (2013 - 2016).
- Junior research fellowship, Department of Atomic Energy, Govt. of India (2010 - 2013).
- Madhava Maharupi Physics Scholarship at Patna University, India (2007 - 2009).

Professional Associations

Society for Neuroscience (SfN) | Federation of European Neuroscience Societies (FENS) | Vision Sciences Society (VSS) | The Japan Neuroscience Society (JNS)

Activities

Mentoring/collaborating with PhD and Master students | Science outreaches | Blood donation camps