SUSHRUT THORAT

CONTACT INFORMATION

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GITHUB: novelmartis OTHER INFO: G-Scholar, Short-CV

GENERAL INTERESTS

The minimal set of priors to enable an artificial agent to function and learn, e.g., self-supervised learning, lifelong learning, memory encoding and retrieval, and action planning; Bio-inspired AI

EDUCATION

Ph.D. in Cognitive Neuroscience *Thesis submitted*
Donders Centre for Cognition, Radboud University, The Netherlands
Thesis: Smart Search - Investigations into human visual search in structured environments
Advisors: Marius Peelen and Marcel van Gerven

M.Sc. (cum laude) in Cognitive Neuroscience *July, 2017*
Center for Mind/Brain Sciences (CIMeC), University of Trento, Italy
Thesis: Using Convolutional Neural Networks to measure the contribution of visual features to the representation of object animacy in the brain
Advisor: Marius Peelen

B.Tech. in Engineering Physics *August, 2015*
Department of Physics, Indian Institute of Technology - Bombay (IIT-B), India
Thesis: Quadcopter Flight Control using Modular Spiking Neural Networks
Advisor: Bipin Rajendran

PEER-REVIEWED PUBLICATIONS

Thorat S, Peelen MV (2022). Body shape as a visual feature: evidence from spatially-global attentional modulation in human visual cortex. *NeuroImage*: 119207.

Thorat S*, Aldegheri G*, Kietzmann TC (2021). Category-orthogonal object features guide information processing in recurrent neural networks trained for object categorization. *Shared Visual Representations in Human & Machine Intelligence Workshop @ NeurIPS*. *equal contribution.

Thorat S, Proklova D, Peelen MV (2019). The nature of the animacy organization in human ventral temporal cortex. *eLife* 8: e47142.

Thorat S*, Aldegheri G*, van Gerven MAJ, Peelen MV (2019). Modulation of early visual processing alleviates capacity limits in solving multiple tasks. *Conference on Cognitive Computational Neuroscience (CCN)*: 226-229. *equal contribution.

Thorat S, van Gerven MAJ, Peelen MV (2018). The functional role of cue-driven feature-based feedback in object recognition. *Conference on Cognitive Computational Neuroscience (CCN)*: 1-4.

Thorat S, Choudhari V (2016). Implementing a Reverse Dictionary, based on word definitions, using a Node-Graph Architecture. *Proceedings of COLING 2016, the 26th International Conference on Computational Linguistics: Technical Papers*: 2797-2806.

Thorat S, Rajendran B (2015). Arithmetic computing via rate coding in neural circuits with spike-triggered adaptive synapses. *International Joint Conference on Neural Networks (IJCNN)*: 1-8.

PUBLICATION DRAFTS

Thorat S, Quek GL, Peelen MV (2022). Statistical learning of distractor object pairs facilitates visual search. *in prep.*

ACHIEVEMENTS/ AWARDS

– Voted **best poster/short-pitch**, among **15 posters**, in the 'Perception, Action, and Control' theme at the annual Donders Poster Session (2020).

- Recipient of the **Merit Award** (2017), awarded to students who achieve remarkable results at the end of their degree, by the University of Trento, Italy.
- Recipient of the **Abstract Award**, awarded to **5 of the 57** accepted abstracts at the Rovereto Workshop on Concepts, Actions and Objects (2017).
- Ranked **721 among 450,000** students in the Joint Entrance Examination **(JEE, 2011)** conducted towards admission to the Indian Institute of Technology (IIT).
- Recipient of the **KVPY scholarship** (2009), awarded to **215 students across India** with talent and aptitude for research, by the Dept. of Science & Technology, Govt. of India.
- Recipient of the **NTSE scholarship** (2007), awarded to **1000 students across India** with high intellect and academic talent, by the National Centre for Educational Research and Technology, Govt. of India.

Technical Proficiency

Programming languages: Python, MATLAB, Javascript

Machine learning frameworks: TensorFlow, PyTorch, MatConvNet

Experimentation frameworks: PsychToolbox, jsPsych, Pavlovia

Neuro-imaging: fMRI (data acquisition and analysis), EEG (data analysis)

Conference Talks/Posters

Category-orthogonal object features guide information processing in recurrent neural networks trained for object categorization
(Poster) *SVRHM @ NeurIPS*, Online, 2021
(Flash talk) *neuromatch 4.0*, Online, 2021
(Poster) *Champalimaud Research Symposium*, Online, 2021

Statistical learning of distractor regularities facilitates visual search
(Poster) *European Conference on Vision Perception*, Online, 2021

Body silhouettes as features in visual search: evidence from spatially-global attention modulation in visual cortex
(Poster) *Donders Poster Session*, Nijmegen, 2020
(Talk) *Neuromatch conference 3.0*, Online, 2020

The nature of the animacy organization in human ventral temporal cortex
(Poster) *Conference on Cognitive Computational Neuroscience (CCN)*, Berlin, 2019

Modulation of early visual processing alleviates capacity limits in solving multiple tasks
(Poster) *Conference on Cognitive Computational Neuroscience (CCN)*, Berlin, 2019

The functional role of cue-driven feature-based feedback in object recognition
(Talk) *Perception Day*, Nijmegen, 2018
(Poster) *Donders Discussions*, Nijmegen, 2018
(Poster) *Conference on Cognitive Computational Neuroscience (CCN)*, Philadelphia, 2018

Using convolutional neural networks to measure the contribution of visual features to the representation of object animacy in the brain
(Poster) *Donders Discussions*, Nijmegen, 2017
(Talk & Poster) *Rovereto Workshop on Concepts, Actions and Objects (CAOs)*, Rovereto, 2017
(Tweets) *Brain Twitter Conference (brainTC)*, 2017

Arithmetic computing via rate coding in neural circuits with spike-triggered adaptive synapses
(Poster) *International Joint Conference on Neural Networks (IJCNN)*, Killarney, 2015

Workshops Attended

IBRO-SIMONS Computational Neuroscience Imbizo (ISi-CNI) *January, 2017*
Cape Town, South Africa
Project: Assessing the role of feature attention in object detection with CNNs.
Advisor: Timothy Lillicrap

Computational Approaches to Memory and Plasticity (CAMP) *June, 2015*
Bangalore, India
Project: The role of the billions of granule cells in the cerebellum.

Teaching Experience

- Co-supervisor - Master thesis (1 student) *Radboud University, 2022*
- Teaching Assistant - Advanced Academic & Professional Skills (writing/reviewing research reports; Masters course) *Radboud University, 2020*
- Guest Lecturer - Academic Skills 2 (research methods; UG course) *Radboud University, 2019*
- Teaching Assistant - Neural Networks (UG course) *Radboud University, 2019*
- Teaching Assistant - Advanced Academic & Professional Skills (writing/reviewing research reports; Masters course) *Radboud University, 2019*
- Supervisor - Research Project 3 (3 students; UG thesis project) *Radboud University, 2018*
- Co-supervisor - Research Project 3 (4 students; UG thesis project) *Radboud University, 2018*
- Guest Lecturer - Academic Skills 2 (research methods; UG course) *Radboud University, 2018*
- Teaching Assistant - Brain for AI (UG course) *Radboud University, 2018*

Reviewing work

eLife'20, Monk Prayogshala'19 , Conference on Cognitive Computational Neuroscience (CCN)'19

Work Experience

General Secretary
Undergraduate division - Department of Physics, IIT Bombay *2014-15*

Content Developer
Avanti Fellows, Delhi *Summer 2013*

Other Reports

- The influence of scene processing on object information [PDF] *2019*
- The functional relevance of neuronal clustering [PDF] *2016*
- Predisposition to towards-gravity periodic motion in chicks [PDF] *2015*
- Gesture Lock [PDF] *2013*