SUSHRUT THORAT

Contact Information

email: sushrut.thorat94@gmail.com webpage: sushrutthorat.com
github: novelmartis Other info: G-Scholar, Short-CV

Goal

Understanding and building resource-constrained agents that can learn and function in the wild

Research Areas

Recurrent computations, lifelong learning, explainable AI, neural representations of scenes

Academic Trajectory

Postdoc in Machine Learning *Ongoing*
Institute of Cognitive Science, Osnabrück University, Germany
Advisor: Tim Kietzmann

Ph.D. in Cognitive Neuroscience *November, 2022*
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

Selected Publications

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.

Anthes D, Thorat S, Konig P, Kietzmann TC (2023). Diagnosing catastrophe: Large parts of accuracy loss in continual learning can be accounted for by readout misalignment. *Conference on Cognitive Computational Neuroscience (CCN)*: 748-751.

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, Doerig A, Kietzmann TC (2023). Characterising representation dynamics in recurrent neural networks for object recognition. *Conference on Cognitive Computational Neuroscience (CCN)*: 645-647.

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 Experience

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)

Selected Talks

Category-orthogonal object features guide information processing in recurrent neural networks trained for object categorization
(Talk) *European Conference on Vision Perception (ECVP)*, Nijmegen, 2022
(Talk) MSc course on *Advanced Neural and Cognitive Modelling*, UvA, Amsterdam, 2022
(Flash talk) *neuromatch 4.0*, Online, 2021

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

The functional role of cue-driven feature-based feedback in object recognition
(Talk) *Perception Day*, Nijmegen, 2018

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

Reviewing work

PLOS Computational Biology, Nature Communications, Science Advances, NeurIPS workshops, Memory & Cognition, eLife, CCN

Workshops Attended

Analytical Connectionism (AC) *September, 2023*
London, United Kingdom
Project: Visual feature manifolds in a convolutional RNN.

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.

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

Supervision Experience

Supervised 11 undergraduate and 2 masters students during their thesis projects.
Notable theses are listed.

- (Masters) Jochem Koopmans: *How our predictions do not deceive us: an investigation of the illusory perception of upside-down letters* — *Radboud University, 2022*
- (Bachelors) Sjoerd Meijer & Ilze Thoonen: *Primed modulation of low-level object features using real-world objects and scenes* — *Radboud University, 2018*

Teaching Experience

- **Lecturer**: *Topics in cognitive neuroscience* (design, teaching, & evaluation; Masters) — *Osnabrück University, 2023*
- **Lecturer**: *Reading group at the intersection of neuroscience & machine learning* (design, supervision, & evaluation; Masters) — *Osnabrück University, 2023*

- Teaching Assistant: *Advanced Academic & Professional Skills* (evaluation; Masters) — *Radboud University, 2020*
- Guest Lecturer: *Academic Skills 2* (teaching & evaluation; Bachelors) — *Radboud University, 2019*
- Teaching Assistant: *Neural Networks* (supervision & evaluation; Bachelors) — *Radboud University, 2019*
- Guest Lecturer: *Academic Skills 2* (teaching & evaluation; Bachelors) — *Radboud University, 2018*
- Teaching Assistant: *Brain for AI* (supervision & evaluation; Bachelors) — *Radboud University, 2018*

Other Work Experience

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

Content Developer
Avanti Fellows, Delhi — *Summer 2013*