Kshitij Dwivedi

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Research Interests

- Computer vision, Computational neuroscience, Transfer learning, Interpretability

Education

PhD in Computer Science, *Expected graduation year (2022)* .

2020–2022 Goethe University of Frankfurt am Main, *Germany (moved with supervisor)*.
Supervisor: Dr. Gemma Roig .

2018–2019 Singapore University of Technology & Design, *Singapore*.
Supervisor: Dr. Gemma Roig .

M.Tech in Electrical Engineering.

2009–2014 Indian Institute of Technology, *Kanpur, India*.

B.Tech in Electrical Engineering.

2009–2014 Indian Institute of Technology, *Kanpur, India*.

Research Experience

July–Sep, 2021 **Research Intern (remote)**, *Allen Institute for AI*, Seattle, USA.
Interpreting representations learned by navigation agents (CVPR 22)

2019–present **Visiting student**, *FU*, Berlin,Germany, Supervisor: Dr. Radoslaw Martin Cichy.
Modeling human visual system to explain fMRI, EEG responses
(Co-organized challenge to predict human brain responses: Algonauts 19, Algonauts 21)

2018–present **PhD Student**, Supervisor: Dr. Gemma Roig.
Applying computer vision to understand human visual system (JoCN 20, PLOS CB 21),
Transfer learning (CVPR 19, ECCV 20)

2017–2017 **Research Engineer**, *ATR*, Kyoto,Japan, Supervisor: Dr. Yukiyasu Kamitani.
Reconstruction of perceived images from brain activity using deep learning and GAN
(Frontiers in Computational Neuroscience, 19)

2014–2017 **Senior Software Engineer**, *Samsung R&D Institute India*, Bangalore.
Computer Vision applications (e.g. segmentation, tracking) for Samsung smartphone cameras
(US Patent on segmentation, Tracking paper, Saliency paper)

2012–2012 **Intern**, *Mercedes-Benz Research & Development North America*, Palo Alto, USA.
Vehicle detection for driver assistance functions

Achievements

- Selected as Lead TA in Neuromatch Academy summer school, 2020
- Selected to attend Brain, Minds and Machines (BMM) summer school 2019
- SUTD President's Graduate Fellowship (January, 2018 – July, 2019)
- First place in LSUN Saliency Challenge, CVPR 2016.

Technical Skills

Programming	Python, C, C++, Matlab.
Frameworks	pytorch, tensorflow, caffe, torch.

Publications

[1] **K. Dwivedi**, G. Roig, A. Kembhavi, and R. Mottaghi, "What do navigation agents learn about their environment?," in *Computer Vision and Pattern Recognition (CVPR)*, 2022.

[2] M. Graumann, C. Ciuffi, **K. Dwivedi**, G. Roig, and R. M. Cichy, "The spatiotemporal neural dynamics of object location representations in the human brain," *Nature Human Behaviour*, pp. 1–16, 2022.

[3] **K. Dwivedi**, M. F. Bonner, R. M. Cichy, and G. Roig, "Unveiling functions of the visual cortex using task-specific deep neural networks," *PLOS Computational Biology*, 2021.

[4] R. M. Cichy, **K. Dwivedi**, B. Lahner, A. Lascelles, P. Iamshchinina, M. Graumann, A. Andonian, N. A. R. Murty, K. Kay, G. Roig, and A. Oliva, "The Algonauts Project 2021 Challenge: How the Human Brain Makes Sense of a World in Motion," *arXiv*, 2021.

[5] **K. Dwivedi**, J. Huang, R. M. Cichy, and G. Roig, "Duality diagram similarity: a generic framework for initialization selection in task transfer learning," in *European Conference on Computer Vision (ECCV)*, 2020.

[6] **K. Dwivedi**, R. M. Cichy*, and G. Roig*, "Unravelling representations in scene-selective brain regions using scene parsing deep neural networks," *Journal of Cognitive Neuroscience*, 2020 (* jointly supervised work).

[7] **K. Dwivedi** and G. Roig, "Representation similarity analysis for efficient task taxonomy and transfer learning," in *Computer Vision and Pattern Recognition (CVPR)*, 2019.

[8] R. M. Cichy, G. Roig, A. Andonian, **K. Dwivedi**, B. Lahner, A. Lascelles, Y. Mohsenzadeh, K. Ramakrishnan, and A. Oliva, "The Algonauts Project: A Platform for Communication between the Sciences of Biological and Artificial Intelligence," *Conference on Cognitive Computational Neuroscience (CCN)*, 2019.

[9] G. Shen*, **K. Dwivedi***, K. Majima, T. Horikawa, and Y. Kamitani, "End-to-end deep image reconstruction from human brain activity," *Frontiers in Computational Neuroscience*, 2019 (* equal contribution).

[10] J. Huang, **K. Dwivedi**, and G. Roig, "Deep anchored convolutional neural networks," *in Computer Vision and Pattern Recognition Workshops (CVPRW) on Compact and Efficient Feature Representation and Learning (CEFRL), 2019.*

[11] **K. Dwivedi**, N. Singh, S. Shanmugham, and M. Kumar, "Deepattent: Saliency prediction with deep multiscale residual network," *in Proceedings of International Conference on Computer Vision and Image Processing (CVIP), 2018*
*(**1st place** in LSUN Saliency Challenge, CVPR 2016).*

[12] **K. Dwivedi**, P. Prabhudesai, and S. R. Shanmugam, "A hybrid method for long term moving object tracker," in *Signal Processing and Communications (SPCOM), 2016 International Conference on*, pp. 1–5, IEEE, 2016.

[13] B. Ghosh and **K. Dwivedi**, "Micromagnetic analysis of a double-barrier synthetic antiferromagnetic mtj stack," *Applied Nanoscience*, vol. 5, no. 7, pp. 771–775, 2015.

[14] B. Ghosh and **K. Dwivedi**, "Micromagnetic analysis of heusler alloy-based perpendicular double barrier synthetic antiferromagnetic free layer mtjs," *Journal of Theoretical and Applied Physics*, vol. 9, no. 3, pp. 207–212, 2015.

Talks

- Estimating Transfer learning performance using Representational Similarity, *Samsung Research Institute, Bangalore, 2022*
- What can Representational Similarity tell us about the Human Visual Cortex and Transfer Learning? , *Allen Institute for Artificial Intelligence (AI2), Seattle, 2022*
- From the functional mapping of the visual cortex to transfer learning using Representational Similarity, *Facebook Reality Labs, New York, 2021*
- Estimating Transfer learning performance using Representational Similarity, *FiveAI, Oxford, 2021*
- Estimating Transfer learning performance using Representational Similarity, *Google Brain, Toronto, 2021*
- Algonauts 2021: hands-on tutorial on development kit for challenge participation, *CCN 2021 Algonauts session*
- Algonauts 2021: How the Human Brain Makes Sense of a World in Motion, *OHBM 2021 Brainhack*
- Unveiling low-level to high-level functions of visual cortex using task-specific deep neural networks, *TeaP 2021 Symposium on developments in deep neural network models of perception: From low- to high-level vision*

Conference and Workshop abstracts

- M.P. Balode, **K. Dwivedi**, G. Roig, R.M. Cichy, "Unraveling the temporal cortical dynamics of indoor scene navigation using behavioral and deep neural network models", Society for Neuroscience, 2021.
- **K. Dwivedi**, M.F. Bonner, R.M. Cichy, G. Roig, "Unveiling functions of visual cortex using task-specific deep neural networks", Neuromatch 2.0, 2020.
- **K. Dwivedi**, M.F. Bonner, G. Roig, "Explaining Scene-selective Visual Area Using Task-specific and Category-specific DNN Units", Vision Science Society, 2019.
- **K. Dwivedi**, G. Roig, "Importance of object selection in Relational Reasoning tasks", NeurIPS Workshop on Relational Representation Learning, 2018.
- **K. Dwivedi**, G. Roig, "Evaluation of plug and play modules for multi-domain learning", ECCV workshop on Interactive and Adaptive Learning, 2018.

Supervision

FU Berlin **Bachelor's Thesis**, *Marta Paula Balode*, *Raphael Leuner*, *Martin Pflaum*.

Master's Thesis, *Andrei Kitaitsev*, *Vanshika Bawa*.

GU Frankfurt **Bachelor's Thesis**, *Domenic Bersch*, *Quang Anh Le Hong*.

Master's Thesis, *Daniel Pietschmann*, *Yannic Vorpahl*.

Teaching

- Lead TA, Neuromatch Academy Summer School 2020
- TA, Multivariate EEG online course 2020, University of Granada
- TA, Computer Vision 2020-21, Goethe University Frankfurt
- TA, Data structure and algorithms 2013, IIT Kanpur