Mohit Vaishnav

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SUMMARY

Broadly my research revolves around exploring different aspects of the abstract reasoning abilities forms the core of intelligence in both humans and animals and incorporating them into machines. I have more than 5 years of experience in developing Deep Neural Networks for Computer Vision and medical imaging for both academia and industries.

EDUCATION

Doctor of Philosophy Oct 2019 - till dated
Serre Lab, Brown University, USA
Artificial and Natural Intelligence Toulouse Institute (ANITI), France
***Thesis**: Exploring the role of self-attention in cognitive and computer vision architectures*
Supervisor: Thomas Serre (Professor, Brown University, USA)

Erasmus Joint Masters Sept 2017 - 2019
*Computer **VI**sion and Ro**BOT**ics (VIBOT)*
Semester 1: University of Bourgogne, France (CGPA: 15.1/20)
Semester 2: University of Girona, Spain (CGPA: 9/10)
Semester 3: Heriot-Watt University, UK (CGPA: 75.6/100)
Thesis: *MU-Net*: A deep learning model for teeth segmentation from X-ray images
Supervisor: Hugues Talbot (Professor, CentraleSupèlèc, France)

Bachelor of Technology (Hons.) July 2009 - 2013
Electronics and Communication Engineering
LNM Institute of Information Technology, Jaipur, India (CGPA: 7.89/10.00),
Thesis: Residue coding technique for video compression
Supervisor: A. K. Tiwari (Assoc. Professor, Indian Institute of Technology, Jodhpur, India)

AREA OF INTEREST

Artificial Intelligence, Computational Neuroscience, Visual reasoning, Computer Vision, Classification, Attention and Memory process, Cognitive science, Machine Intelligence

INDUSTRIAL EXPERIENCE

- WeDiagnostiX: Masters Thesis with a Dental AI startup where I developed first working prototype for the classification/understanding of maxillary structures from X-ray imaging using Deep learning. My responsibilities included creating an end-to-end pipeline, starting with data collection and labeling till building a working prototype. 2019
- Quelia Systems Inc.: During the summer internship, I was tasked to build an application for estimating tyre wear using a portable mobile camera and computer vision technique. With the software developed, any person can approximate the depth of the treads and accordingly take action to replace them if needed. 2018

ACADEMIC EXPERIENCE

- *Reviewer Task:* IEEE Transaction on Evolutionary Computation 2012, NeurIPS 2021, CVPR 2022/23, ICML 2022, ECCV 2022
- Research Assistant in Ajman University, U.A.E. 2018
- Offshore working with Suspect Technologies Inc., a startup by Massachusetts Institute of Technology (*MIT*) Camera Culture Group members. 2016
- Contributed to **Kumbhathon** for innovating the Kumbha festival by MIT USA and developed an algorithm for "Abnormal Motion Detection" 2015
- Undergraduate Summer Research Internship at Indian Institute of Science (IISc), Bangalore (India), under the supervision of Prof. K. R. Ramakrishnan and worked on 3D Video Synopsis: Capturing to Transmission 2012
- Undergraduate Summer Research Internship at Global Internship Program In Engineering Innovation And Design Indian Institute of Technology (IIT) Delhi (India), where I wrote a review on compression sensing. 2011
- Undergraduate Summer Research Internship at Indian Institute of Technology (IIT), Jodhpur (India), under the supervision of Prof. A. K. Tiwari and worked on developing lossless video compression techniques. 2010

TEACHING EXPERIENCE

- Taught *Basics of Introduction to Computer vision* at the Federal University of Toulouse Midi-Pyrènèes, France 2021,'22
- Taught *Visual Reasoning in Computer Vision* at the Federal University of Toulouse Midi-Pyrènèes, France 2021,'22
- Supervised 15 M1 students at Paul Sabatier University, France for the course *Initiation to research work (project) (EMINC2B2)*, 2021
- Teaching Assistant for Electronics lab at LNMIIT, India 2010

CONFERENCE TALKS

- Ivan Felipe, Thomas Fel, Mohit Vaishnav, Peter Wilf, Thomas Serre, "Using Artificial Intelligence To Identify Fossil Angiosperm Leaves At Family Level", *Geological Society of America*, Connects, Denver (USA) 2022
- Mohit Vaishnav, Thomas Fel, Ivan Felipe, Jacob A Rose, Peter Wilf, Thomas Serre, "Understanding how deep neural networks categorize living and fossil leaves", *Botany* (virtual) 2021
- Ivan Felipe, Jacob A Rose, Thomas Fel, Mohit Vaishnav, Peter Wilf, Thomas Serre, "A deep-learning-based approach for automated fossil leaf identification", *Botany* (virtual) 2021
- Computational models of visual reasoning at *Brown Unconference* 2021

HONORS AND AWARDS

- 5^{th} position on Kaggle competition *Herbarium 2021* 2022
- Agence Nationale de la Recherche (ANR) fellowship during Ph.D. 2019-22
- Charpak Masters Scholarship from French Government 2017
- Santander Grant by University of Girona (Spain) 2017
- Erasmus+ Mobility Grant for Masters study abroad by European Commission 2017
- Bourgogne Regional Council Grant 2017
- Travel grant from Microsoft Research for Data Compression Conference 2011
- Selected in Govt. of India,National fellowship scheme, Kishor Vaigyanic Protsahan Yojna funded by DST, in Engineering stream 2010

LEADERSHIP POSITION

- Elected as Student representative for *ANITI*, France 2020-22
- Elected Member of Senate, *Science and Tech. Council*, LNMIIT, India 2013
- Founder and Membership head, *IEEE Student branch*, LNMIIT, India 2012
- Founder and Organizer, Technical Festival *Plinth*, LNMIIT, India 2012

PUBLICATIONS

- **Mohit Vaishnav**, Thomas Serre; "GAMR: Guided Attention Model of (visual) Reasoning." *The Eleventh International Conference on Learning Representations (ICLR)* https://openreview.net/forum?id=iLMgk2IGNyv (2023)
- Aimen Zerroug, **Mohit Vaishnav**, Julien Colin, Sebastian Musslick, Thomas Serre; "*A Benchmark for Compositional Visual Reasoning.*" *In Proceedings of the Neural Information Processing Systems Track on Datasets and Benchmarks* abs/2206.05379 (2022)
- **Mohit Vaishnav**, Remi Cadene, Andrea Alamia, Drew Linsley, Rufin VanRullen, Thomas Serre; "Understanding the Computational Demands Underlying Visual Reasoning." *Neural Computation*; doi: https://doi.org/10.1162/neco_a_01485 (2022)
- **Mohit Vaishnav**, Thomas Fel, Ivan Felipe, Thomas Serre; "Conviformer: Convolutionally guided Vision Transformer." *ArXiv* abs//2208.08900 (2022)
- **Mohit Vaishnav**, Binny Tewani and Anil Kumar Tiwari; "Residue coding technique for video compression", 24^{th} IEEE *Data Compression Conference (DCC)* (2014), Snowbird, UT, USA, doi: 10.1109/DCC.2014.92
- **Mohit Vaishnav** and Anil Kumar Tiwari; "Bin classification using temporal gradient estimation for lossless video coding", 24^{th} IEEE *Data Compression Conference (DCC)* (2014), Snowbird, UT, USA, doi: 10.1109/DCC.2014.93
- **Mohit Vaishnav**, Dinesh Kumar Chobey, and Anil Kumar Tiwari; "Temporal Stationarity Based Prediction Method For Lossless Video Coding". In Proceedings of the 2014 *Indian Conference on Computer Vision Graphics and Image Processing (ICVGIP)*. Association for Computing Machinery, New York, NY, USA, Article 39, 16. https://doi.org/10.1145/2683483.2683522
- Dinesh Kumar Chobey, **Mohit Vaishnav** and Anil Kumar Tiwari; "An optimal switched adaptive prediction method for lossless video coding", 23^{rd} IEEE *Data Compression Conference (DCC)* (2013), Snowbird, UT, USA, doi: 10.1109/DCC.2013.63
- **Mohit Vaishnav**, Ashwani Sharma and Anil Kumar Tiwari; "A noble computationally efficient motion compensation method based on pixel by pixel prediction", 21^{st} IEEE *Data Compression Conference (DCC)* (2011), Snowbird, UT, USA, doi: 10.1109/DCC.2011.83

WORKSHOPS

- Attended Reinforcement Learning Virtual School, organized by ANITI 2021
- Attended Computational Neuroscience course on Coursera 2021
- Attended Computational Psychiatry Course organized by the Translational Neuromodeling Unit, University of Zurich & ETH Zurich 2020
- Machine Learning course of Andrew Ng by Coursera 2018

SKILLS

- **Programming Languages** Python Shell C C++
- **Data Science** Pytorch Tensorflow/Keras Scikit-Learn Numpy Pandas
- **Tools & OS** MATLAB Git Jupyter Vim VSCode Linux MacOs