# Jayneel Parekh

✉ parekh@isir.upmc.fr

## Education

September 2019–July 2023 **PhD in Machine Learning**, Télécom Paris, Institut Polytechnique de Paris, France
**Thesis:** A Flexible Framework for Interpretable Machine Learning: Application to Image and Audio Classification
**Advisors**: Prof. Florence d'Alché-Buc & Prof. Pavlo Mozharovskyi, Telecom Paris
**Jury**: Grégoire Montavon, Patrick Pérez, David Alvarez-Melis, Nicolas Thome, Stéphane Canu, Chloe Clavel
- Developed post-hoc/by-design interpretation methods using concept-based representations for deep neural networks, with applications to audio and image classification tasks

July 2014–19 **Dual Degree (B.Tech + M.Tech)**, IIT Bombay, Electrical Engineering, CPI: 9.05/10
**Thesis:** Audio Style Transfer: Transformations between speech and singing
**Advisors**: Prof. Preeti Rao, IIT Bombay & Dr. Yi-Hsuan Yang, Academia Sinica, Taiwan
- Investigated style transfer techniques for audio signals
- Focused on converting spoken audio into sung audio and vice-versa using deep learning

## Awards and Achievements

2023 Awarded STIC Doctoral Prize (Saclay) 2023 **accessit (2nd place)** for NeurIPS'22 publication.

2015–18 Awarded **AP grade** for exceptional performance in the course EE763: Science of Information, Statistics and Learning (Spring 17-18), and ES200: Environmental Studies (Autumn 15-16)

2016 Awarded **travel grant** and **distinctive mention** for work at MediaEval 2016 Workshop held at Netherlands Institute of Sound and Vision, Hilversum, Netherlands

2013 Awarded **Kishore Vaigyanik Protsahan Yojana** (KVPY) **Fellowship** 2013

## Publications

[1] **J. Parekh**, S. Parekh, P. Mozharovskyi, G. Richard and F. d'Alché-Buc. Tackling Interpretability in Audio Classification Networks with Non-negative Matrix Factorization. Accepted in **IEEE/ACM TASLP** (2023).

[2] **J. Parekh**, S. Parekh, P. Mozharovskyi, F. d'Alché-Buc and G. Richard. Listen to Interpret: Post-hoc Interpretability for Audio Networks with NMF. Published in **NeurIPS 2022**.

[3] **J. Parekh**, P. Mozharovskyi and F. d'Alché-Buc. A Framework to Learn with Interpretation. Published in **NeurIPS 2021**.

[4] **J. Parekh**, P. Rao, and YH Yang. Speech-to-Singing Conversion in an Encoder-Decoder Framework. Published in **IEEE ICASSP 2020** (**Oral**).

[5] **J. Parekh**, H. Tibrewal, and S. Parekh. Deep Pairwise Classification and Ranking for Predicting Media Interestingness. Published in **ACM ICMR 2018**.

[6] V. Beaudouin, I. Bloch, D. Bounie, S. Clemencon, F. d'Alche-Buc, J. Eagan, W. Maxwell, P. Mozharovskyi, and **J. Parekh**. Flexible and Context-Specific AI Explainability: A Multidisciplinary Approach. arXiv preprint, shorter version presented at **ECAI 2020** workshop

## Work Experience and Projects

December 2023–Present **Postdoctoral Researcher**, Sorbonne Université France
Understanding Representations in Large Multimodal Models
**Advisor**: Prof. Matthieu Cord, (Sorbonne Université and Valeo AI)
- Developing methods to understand representations computed in large visual-language multimodal models.

Feb–April 2018 **Supervised Research Exposition**, IIT Bombay
Surface Defect Detection
**Advisor**: Prof. Subhasis Chaudhuri, Department of Electrical Engineering, IIT Bombay
- Explored various techniques and studied relevant literature for surface defect detection
- Applied transfer-learning based methods for plant disease detection

May–June 2017 **Summer Intern**, TECHNICOLOR R&D France
2D & 3D Human Pose Estimation Networks
**Advisors**: Pierre Hellier (Principal Scientist) & Louis Chevallier, Technicolor R&D France
- Completed internship as part of an industrial project on Motion Synthesis in Animation
- Implemented and tested stacked hourglass based deep CNNs for 2D and 3D human pose estimation

2016 & 2017 **MediaEval Benchmarking Initiative**
Predicting Media Interestingness Task
**Organizers**: Technicolor, France, ETH Zurich *et al.*
- Developed novel methods for ranking a set of images/video-shots extracted from movie trailers according to their interestingness to a common viewer
- Netherlands 2016: achieved a mean average precision (MAP) of 0.23 for images - **Team Rank 3/12**
- Ireland 2017 (web participation): achieved a MAP of 0.25 for images & 0.19 for videos

2016–18 **Selected Undergraduate Projects**
- Image Style Transfer using Graph-CNN – Implemented a unsupervised, graph signal processing based, random shallow CNN for image style transfer
- Blind Audio Source Separation – Implemented a NMF, LPC based error clustering criterion algorithm for blind audio source separation
- Detection of Moving Objects in Videos – Studied and implemented simplified version of a paper based on mean-shift and max-flow min-cut algorithms for the same
- Artificial Synesthesia – Studied and implemented a simplified CCA-based algorithm for image-audio cross modal retrieval

## Services

**Organizing** Co-chair, Trustworthy and Frugal ML workshop, ELLIS Unconference 2023 Paris

**Reviewing** NeurIPS'23 (Top reviewer), TPAMI, JMLR, TMM

**Teaching** Served as teaching assistant for courses: **Machine Learning** (Telecom Paris, thrice during 2020–22), **Analytical Signal Processing** (IIT Bombay, Spring 18-19), **Probability & Random Processes** (IIT Bombay, Autumn 18-19) and **Linear Algebra** (IIT Bombay, Autumn 17-18)

## Skills

**Programming** Languages: Python (including PyTorch, Keras, Tensorflow), C/C++, VHDL

Software Tools: AutoCAD, SUMO, Ngspice, Quartus Prime

**Courses** Advanced courses in ML, CV, Optimization, Signal Processing, Summer schools – MuSTeR 2016 (IISc Bangalore), MLSS 2021 (Virtual), OxML 2022 (University of Oxford)

## Extra-Curricular

### Sports

2014-18 **Silver medal** in Institute Squash League, **3X finalist** of Squash General Championship

2009 Umed Club District Open Squash Championship (Finalist)

2007-08 **Participated** in Harish Chandra Golcha Memorial Rajasthan Open Squash Championship, Junior National Squash Championship, Otters Open, CCI Open

### Cultural

2008-12 Member of Choir group in DPS Jodhpur

2009 & 2005 Samvaad – A personality development program – 45 and 30 days respectively