Jayneel Parekh

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Education

September 2019–Present **PhD in Machine Learning**, Télécom Paris, Institut Polytechnique de Paris, France
Thesis: Interpretable Machine Learning
Advisors: Prof. Florence d'Alche Buc & Prof. Pavlo Mozharovskyi, Telecom Paris
- Building machine learning models which are interpretable by design. Focuses primarily on deep learning and neural networks and more generally for differentiable models.

July 2014–19 **Dual Degree (B.Tech + M.Tech)**, IIT Bombay, Electrical Engineering, CPI: 9.05/10
Specialization: Communication & Signal Processing
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

2018–15 Achieved **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, F. d'Alché-Buc and G. Richard (2022). Listen to Interpret: Post-hoc Interpretability for Audio Networks with NMF. **Accepted** at **NeurIPS 2022**

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

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

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

[5] 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

Projects and Internships

May–June 2017 **Summer Internship**, 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 Participation**
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

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 2016 **Summer Undergraduate Research Programme**, IIT Bombay
Rank Modulation Codes for Flash Memory
Supervisor: Prof. V. Saravanan, Department of Electrical Engineering, IIT Bombay
- Attempted proving existence/non-existence of perfect codes in permutation codes with Kendall-τ metric

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 (CS726 **Instructor**: Prof. Sunita Sarawagi)
- Blind Audio Source Separation – Implemented a NMF, LPC based error clustering criterion algorithm for blind audio source separation (Python) (EE338 **Instructor**: Prof. Vikram Gadre)
- Semantic Labeling – Developed a novel superpixel based algorithm for semantic segmentation of outdoor images (Python)
- 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 (CS663 **Instructor**: Prof. Suyash Awate)
- Q-Learning for TSC – Implemented Q-Learning based algorithms for traffic signal control on a grid based 9 junction road network using SUMO traffic simulator (EE763 **Instructor**: Prof. Vivek Borkar)
- Artificial Synesthesia – Studied and implemented a simplified CCA-based algorithm for image-audio cross modal retrieval (CS403 **Instructor**: Prof. Ganesh Ramakrishnan)

Teaching Assistantship

2020–22 **Machine Learning**: Supervised 8 practical/coding sessions for 15-20 Master's students across 3 courses on fundamental ML topics (Perceptron, SVM, NN, Random Forests)

2018–19 **Analytical Signal Processing** + **Probability & Random Processes**: Assisted the instructor for course and examination activities

2017 **Linear Algebra**: Conducted weekly tutorials and mentored 48 first-year UG students

Skills

Programming Languages: C/C++, Python (including Tensorflow, Keras, PyTorch), VHDL
Software Tools: AutoCAD, SUMO, Ngspice, Quartus Prime

Courses Advanced courses in ML, CV, Optimization, Signal Processing, Music Technology & Research Summer School by UPF Barcelona & IISc Bangalore, MLSS 2021, OxML 2022.

Extra-Curricular

Sports

2018 Institute Squash League (Final)

2015-17 Represented Hostel-9 in Squash General Championship (Final in all 3 years)

2015 Institute Open Squash Championship (Quarter-Final)

2015 DJ Sanghvi College of Engineering Squash Tournament (Team Event) (Quarter-Final)

2014 Hostel-15 Captain in Squash General Championship, IIT-B (Quarter-Final)

2009 Umed Club District Open Squash Championship (Final)

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

2003-10 Won several competitions like Calligraphy, Debate, Drama, Poetry recitation, Best Student Award

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