Avish Vijayaraghavan

Translatable Machine Learning for Precision Medicine

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Education

Imperial College London Oct 2021 - Present
PhD Candidate in AI for Healthcare, supervised by Joram M. Posma and Philip Molyneaux London, England

- Working on multimodal, interpretable learning for idiopathic pulmonary fibrosis.
- Part of the third cohort for the AI4Health CDT programme. Funded by UKRI and AstraZeneca.
- CDT representative for '22/23.

University College London Sept 2020 - Sept 2021
MSc in Precision Medicine (Distinction, ranked 1st) London, England

- Main courses: Bioinformatics & Structural Biology, Genetics & Epigenetics of Disease, Multi-Omics & Ethics, Precision Diagnosis for Precision Medicine, Computational Biology, Nanomedicines.

Imperial College London Sept 2017 - July 2020
BEng in Mathematics and Computer Science (First Class Honours in final year) London, England

- Main courses: Mathematical Biology, Applied Probability, Statistical Learning, Machine Learning, Computer Vision, Graphics, Robotics, Graphs and Algorithms.

Work Experience

University Tutor Jan 2022 - Present
Maths & Artificial Intelligence Arts & Business College of London

- Tutoring A-Level and university students in maths & artificial intelligence.
- Helped set up and deliver online data analytics course to foreign students.

Undergraduate Research Intern July - Sept 2019
Spatial Statistics, supervised by Samir Bhatt Imperial Branch of St Mary's Hospital

- Contributed to short project that aimed to improve the predictive accuracy of a machine learning method using a technique from differential geometry.

Projects

Deep Multi-Omic Clustering Apr 2022 - Present
PhD Project 2

- Adapted multi-modal variational auto-encoders to the multi-omics setting with missing modalities (omics).
- Modified architecture to make the latent space more amenable to biological clustering.

Structurally Integrating Biomedical Knowledge Into Proteomics Models Apr 2022 - Present
PhD Project 1

- Created protein co-occurrence graph from literature using a large biomedical language model called BERN2.
- Used graph to modify neural network structure for biological interpretability while maintaining performance.

Science Communication Apr 2022 - Present
Translatable Machine Learning for Precision Medicine Portfolio on website

- Created two YouTube videos on the geometry of gene expression dynamics and on increasing diversity in genomic studies.
- Blog post reflecting on a classic interpretability paper and its implications for scientific discovery.

3D Graph Representation Learning for Transition State Generation Jan - Sept 2021
MSc Thesis, supervised by Brooks Paige Code

- Created encoder-decoder model to generate transition states for unimolecular reactions in order to better characterise molecular synthesis routes.
- Achieved similar performance to state-of-the-art model with improved uncertainty calibration.

Data Science for DLBCL Stratification Nov 2019 - Aug 2020
BEng Thesis, supervised by Elsa Angelini Code

- Worked with biologists to split DLBCL cancer patients into more precise subgroups using machine learning.
- Presentation featured on Department of Computing's YouTube channel.

Teaching Service

AI4Health Technical Troubleshooting Planned Mar 2023
PhD in AI for Healthcare Imperial College London

- Led design of short course for future cohorts of my AI4Health CDT to make the transition easier for those with minimal coding experience.
- The course covers concepts like the Linux command line, programming environments, GPUs, and specific considerations of our CDT hardware.

Biomedical Data Science May 2022
BSc in Biomedical Sciences Imperial College London

- Helped develop Python notebook tutorials alongside other GTAs.
- Assisted main course lead in computational tutorials processing omics data.

Statistical Programming Nov 2021
MRes in Biomedical Research (Data Science Stream) Imperial College London

- Assisted main course lead in computational statistics tutorials.

Skills & Interests

- **Programming Languages**: familiar with Python, R; exposed to Java, SQL, C.
- **Technologies**: familiar with PyTorch, Git, Linux/Unix, LaTeX; exposed to CI/CD (GitLab, AWS, Azure), TensorFlow.
- **Extracurricular**: Imperial College Computing Football Team Captain '19/20, Imperial College Hip Hop Society Founder & Web Secretary '19/20, Music Journalism (published as a magazine), Imperial College DJ & Production Society '21/22, Screenwriting (our dark comedy feature length, "A Small Flame", is currently in submission to South Asian film festivals).
- **Languages**: English (Native), Russian (Basic), Spanish (Basic).

Achievements

Dean's List for UCL Division of Medicine Sep 2021
Highest performing student on MSc in Precision Medicine '20/21. University College London - London, UK

"hatch" Hack 2018 Winners Nov 2018
Business model for app targeting postpartum depression in North India. Ministry of Justice - London, UK

B1 Proficiency Russian June 2018
Referring to the TKRI levels, progressed from A2+ to B1. Liden & Denz School - Moscow, Russia

Future Problem Solving Program 2014-2017
Won national program four years running; top European team in international program in USA. UK, USA