

# JESSICA LOO

Data Scientist, Verily Life Sciences  
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<https://jessicaloo.github.io/>

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## EDUCATION

**PhD, Biomedical Engineering, Duke University**  
3.94 GPA

August 2017 – May 2022

**BEng/MEng, Biomedical Engineering, Imperial College London**  
1<sup>st</sup> Class Honours (equivalent to 4.0 GPA)

October 2011 – August 2015

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## RESEARCH / WORK EXPERIENCE

**Data Scientist, Verily Life Sciences**

June 2022 – Present

- Developing machine learning-based algorithms for clinical applications in pathology.

**Graduate Research Assistant, Vision and Image Processing Laboratory, Duke University**

August 2017 – May 2022

- Developed and validated deep learning-based algorithms for clinical applications in ophthalmology such as the automatic segmentation and quantification of biomarkers in retinal and corneal diseases on optical coherence tomography, angiography, and slit-lamp photography.
- Developed image analysis software for optical coherence tomography, scanning laser ophthalmoscopy, microperimetry, and color fundus images for clinical studies and trials.

**Data Science Intern, Verily Life Sciences**

May 2021 – August 2021

- Developed deep learning-based algorithms for quality control of autofluorescence images for clinical applications in pathology.

**Software Engineer (Research & Development), Neuramatrix Sdn. Bhd.**

January 2016 – May 2017

- Developed a deep learning-based classification algorithm to predict property age based on Google Street View images for property insurance applications.
- Developed image processing algorithms for automatic detection of salient points in images for robotic applications.

**Undergraduate Research Assistant, Developmental Biomechanics Laboratory, Imperial College London**

June 2014 – August 2015

- Developed a diagnostic test for the classification of fetal health based on leg and head movement parameters modelled and extracted from clinical cine-MRI scans.
- Developed image processing algorithms to semi-automatically track the positions of the hip, knee, ankle, and spine in fetal clinical cine-MRI scans for investigations into how skeletal development is affected by fetal movement in the womb.

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## SELECTED JOURNAL PUBLICATIONS

**J. Loo**, G. J. Jaffe, J. L. Duncan, D. G. Birch, and S. Farsiu, "Validation of a Deep Learning-Based Algorithm for Segmentation of the Ellipsoid Zone on Optical Coherence Tomography Images of an *USH2A*-Related Retinal Degeneration Clinical Trial," *Retina* 42(7), 1347-1355, **2022**.

**J. Loo**, C. X. Cai, J. Choong, E. Y. Chew, M. Friedlander, G. J. Jaffe, and S. Farsiu, "Deep Learning-Based Classification and Segmentation of Retinal Cavitations on Optical Coherence Tomography Images of Macular Telangiectasia Type 2," *British Journal of Ophthalmology* 106(3), 396-402, **2022**.

**J. Loo**, M. A. Woodward, V. Prajna, M. F. Kriegel, M. Pawar, M. Khan, L. M. Niziol, and S. Farsiu, "Open-Source Automatic Biomarker Measurement on Slit-Lamp Photography to Estimate Visual Acuity in Microbial Keratitis," *Translational Vision Science & Technology* 10(12), 2, **2021**.

**J. Loo**, M. F. Kriegel, M. M. Tuohy, K. H. Kim, V. Prajna, M. A. Woodward, and S. Farsiu, "Open-Source Automatic Segmentation of Ocular Structures and Biomarkers of Microbial Keratitis on Slit-Lamp Photography Images Using Deep Learning," *IEEE Journal of Biomedical and Health Informatics* 25(1), 88-99, **2021**.

D. Y. Kim, **J. Loo**, S. Farsiu, and G. J. Jaffe, "Comparison of Single Drusen Size on Color Fundus Photography and Spectral-Domain Optical Coherence Tomography," *Retina* 41(8), 1715-1722, **2021**.

L. K. Mukkamala, J. Avaylon, R. J. Welch, A. Yazdanyar, P. Emami-Naeini, S. Wong, J. Storkersen, **J. Loo**, D. Cunefare, S. Farsiu, A. Moshiri, S. S. Park, and G. Yiu, "Intraoperative Retinal Changes May Predict Surgical Outcomes After Epiretinal Membrane Peeling," *Translational Vision Science & Technology* 10(2), 36, **2021**.

**J. Loo**, T. E. Clemons, E. Y. Chew, M. Friedlander, G. J. Jaffe, and S. Farsiu, "Beyond Performance Metrics: Automatic Deep Learning Retinal OCT Analysis Reproduces Clinical Trial Outcome," *Ophthalmology* 127(6), 793-801, **2020**.

M. F. Kriegel, **J. Loo**, S. Farsiu, V. Prajna, M. Tuohy, K. H. Kim, A. N. Valicevic, L. M. Niziol, H. Tan, H. A. Ashfaq, D. Ballouz, and M. A. Woodward, "Measurement Reliability for Anterior Segment and Keratitis Morphology," *Cornea* 39(12), 1503-1509, **2020**.

K. J. McHugh, D. Li, J. C. Wang, L. Kwark, **J. Loo**, V. Macha, S. Farsiu, L. A. Kim, and M. Saint-Geniez, "Computational Modeling of Retinal Hypoxia and Photoreceptor Degeneration in Patients with Age-Related Macular Degeneration," *PLOS One* 14(6), e0216215, **2019**.

**J. Loo**, L. Fang, D. Cunefare, G. J. Jaffe, and S. Farsiu, "Deep Longitudinal Transfer Learning-Based Automatic Segmentation of Photoreceptor Ellipsoid Zone Defects on Optical Coherence Tomography Images of Macular Telangiectasia Type 2," *Biomedical Optics Express* 9(6), 2681-2698, **2018**.

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## SELECTED CONFERENCE PRESENTATIONS

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E. M. Lad, W. Liang, G. J. Jaffe, Z. Deng, **J. Loo**, D. Mukherjee, and S. Farsiu, "The RUSH2A Study: Baseline Microperimetry and SD-OCT Measures," *ARVO Annual Meeting*, **2021** (Virtual).

**J. Loo**, C. X. Cai, E. Y. Chew, M. Friedlander, G. J. Jaffe, and S. Farsiu, "Deep Learning-Based Automatic Segmentation of Retinal Cavitations on OCT Images of MacTel2," *ARVO Annual Meeting*, **2020** (Virtual).

S. Farsiu, **J. Loo**, J. L. Duncan, D. G. Birch, and G. J. Jaffe, "Deep Learning-Based Automatic Segmentation of Intact Ellipsoid Zone Area on Optical Coherence Tomography Images of *USH2A*-Related Retinal Degeneration," *ARVO Annual Meeting*, **2020** (Virtual).

S. Onal, **J. Loo**, T. Nguyen, M. Cherukury, S. Farsiu, and G. J. Jaffe, "In-Vivo Quantitative Analysis of Pterygium Volume Using Anterior Segment Optical Coherence Tomography Imaging," *ARVO Annual Meeting*, **2020** (Virtual).

A. Hasan, Z. Deng, **J. Loo**, D. Mukherjee, J. L. Duncan, D. G. Birch, G. J. Jaffe, and S. Farsiu, "Meta-Learning Approach to Automatically Register Multivendor Retinal Images," *ARVO Annual Meeting*, **2020** (Virtual).

**J. Loo**, T. E. Clemons, E. Y. Chew, M. Friedlander, G. J. Jaffe, and S. Farsiu, "Automatic Deep Learning OCT Analysis Algorithm Reliably Reproduces Expert-Evaluated Outcome of a Randomized Clinical Trial for Macular Telangiectasia Type 2 Treatment," *ARVO Annual Meeting*, Vancouver, BC, **2019** (Poster).

S. Farsiu, **J. Loo**, M. F. Kriegel, M. Tuohy, V. Prajna, and M. A. Woodward, "Deep Learning-Based Automatic Segmentation of Stromal Infiltrates and Associated Biomarkers on Slit-Lamp Images of Microbial Keratitis," *ARVO Annual Meeting*, Vancouver, BC, **2019** (Poster).

M. F. Kriegel, **J. Loo**, V. Prajna, S. Farsiu, M. Tuohy, P. M. Gomp, L. Niziol, and M. A. Woodward, "Reliability of Physicians' Measurements When Manually Annotating Images of Microbial Keratitis," *ARVO Annual Meeting*, Vancouver, BC, **2019** (Poster).

**J. Loo**, T. E. Clemons, E. Y. Chew, M. Friedlander, G. J. Jaffe, and S. Farsiu, "Deep Learning Retinal OCT Analysis Reliably Predicts the Outcome of a Real-World Clinical Trial," *Ophthalmic Technologies XXIX*, San Francisco, CA, **2019** (Podium).

**J. Loo**, L. Fang, D. Cunefare, G. J. Jaffe, and S. Farsiu, "Deep Learning-Based Automatic Segmentation of Ellipsoid Zone Defects in Optical Coherence Tomography Images of Macular Telangiectasia type 2," *ARVO Annual Meeting*, Honolulu, HI, **2018** (Podium).

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## TEACHING EXPERIENCE

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**BME 544 Digital Image Processing (Teaching Assistant)** **Fall 2020**

- Developed and taught lectures on deep learning for inverse problems (denoising, super-resolution, etc.) and motion estimation.
- Held weekly office hours, communicated with students via email, graded assignments, and prepared solutions.

**BME 671L Signal Processing & Applied Mathematics (Teaching Assistant)** **Spring 2021**

- Conducted weekly lab sessions on signal processing using MATLAB.
  - Held weekly office hours, communicated with students via email, graded assignments, and prepared solutions.
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## AWARDS

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**Outstanding Teaching Assistant Award (Duke University)** **2021**  
Honorable Mention

**John T. Chambers Fellowship Program (Duke University)** **2019, 2020**  
One Year Special Award

**Medical Imaging Training Program (Duke University)** **2019**  
Affiliated Scholar

**Duke Ophthalmology Trainee Day Scientific Symposium (Duke University)** **2018**  
Best Research Presentation Award

**Fitzpatrick Institute for Photonics Symposium (Duke University)** **2018**  
2<sup>nd</sup> Place Poster Award

**Stephen Richardson Prize (Imperial College London)** **2015**  
Best MEng Project Award

**Engineering Dean's List (Imperial College London)** **2013, 2014, 2015**  
Top 10% of the Class

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**AREAS OF INTEREST** Deep Learning, Machine Learning, Computer Vision, Image Analysis, Medical Imaging, Ophthalmology

**TECHNICAL SKILLS** Python, MATLAB, C/C++, TensorFlow, PyTorch, MatConvNet

**OTHER QUALIFICATIONS** Machine Learning by Stanford University (Coursera certification: WBV7QCZLNfZV)  
Trinity-Guildhall Music Performance, Grade 8 (Piano); ABRSM, Grade 5 (Music Theory)

**LANGUAGES** English (Fluent), Malay (Fluent), Spanish (Basic), Mandarin (Conversational)