Samuel Tonks

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Highly analytical, detail-orientated Data Scientist with 7+ years of experience in the global pharmaceutical industry (GSK), with a focus on researching, designing and implementing Machine Learning (ML) solutions to a broad spectrum of healthcare problems. Affiliated with The Alan Turing Institute, the UK's leading institute of Artificial Intelligence (AI) as an enrichment student and ongoing core developer for Scivison [1] an open-source computer vision (CV) package. Proven track record of solving complex business problems by creatively integrating multidisciplinary approaches to understand, model and predict patterns in very large datasets. Hands-on experience and subject matter expertise in generative model-based multimodal image-to-image translation frameworks with multiple publications at world-leading international conferences [2] [3] [4]. Experienced in running workshops [5] at The Alan Turing Institute and teaching University of Birmingham Computer Science undergraduate and postgraduate students in algorithm design, machine learning, computer vision and visualisation modules.

EXPERIENCE

- **GSK** London, UK.
  University Worker (Ph.D) *Nov 2020 - Present*
  Recruited to research and implement the machine learning (ML) based strategy for multi-modal image-to-image translation (MI2I) applications within GSK Pharma R&D.

  - **Responsibilities:** Explore, design, and develop cutting-edge generative model-based approaches for MI2I applications such as virtual staining. Design meaningful quantitative methods to evaluate the performance of these methods given the specific real-world application. Set up and conduct large-scale experiments to test hypotheses and drive product development. Partner with stakeholders from different departments to define AI solutions to MI2I problems.:
  - **Achievements:**
    Designed and implemented end-to-end pipeline utilising advanced generative adversarial models for virtual fluorescence microscopy resulting in significant efficiency improvements including but not limited to; reducing the staining time from weeks to minutes and enabling multiple live cell time-point studies of a single plate instead of three plates. This research led to an oral presentation and paper at the International Symposium of Bioimaging 2023 [6].
    Conducted large-scale analysis into the generalisability of virtual stain models identifying novel findings around how to utilise the diversity of bioimaging data to train generalizable models resulting in considerable reductions in the number of cell or phenotype-specific models required to be trained for large-scale industry applications. My research led to a paper at the conference for Computer Vision and Pattern Recognition (CVPR) Microscopy Imaging Workshop 2024 [7].
    Designed and implemented a diffusion-based method for concurrently predicting the virtual fluorescence as well as a measure of uncertainty of the cells within each prediction within the space of relevant biological features. Resulting in meaningful biological uncertainty quantification and improvements in AI trustworthiness. Submission for ICML 2025 planned.:

- **GSK** London, UK
  Data Scientist *Jul. 2018 - Oct. 2020*
  Recruited into Consumer Healthcare Market Analytics group for Northern Europe to implement ML-based forecasting methodologies, utilise automation to improve data gathering processes and provide commercial insights for the leadership team.

  - **Responsibilities:** Research and implement suitable ML-based forecasting methodologies to improve forecasting accuracy. Improve operational efficiencies through automation of data extraction and modeling. Collaborate with cross-functional teams of Senior Brand Managers, Finance Directors, and Tech to drive commercial decision-making.:
  - **Achievements:** Research and implement suitable ML-based forecasting methodologies to improve forecasting accuracy. Improve operational efficiencies through automation of data extraction and modeling. Collaborate with cross-functional teams of Senior Brand Managers, Finance Directors, and Tech to drive commercial decision-making.:

- **GSK** London, UK
  Technical Associate *Jan. 2017 - Jun. 2018*
  Recruited onto GSK's Global Future Leaders Programme working in GSK Global Tech on the global ERP system implementation. Rotated across information security and robotic process automation.

  - **Responsibilities:** Design and implement SAP information security testing framework across the GSK global ERP system (16+ countries 20+ manufacturing and commercial sites. Research tools for improving operational efficiencies including Robotic Process Automation (RPA) and work with the senior leadership team to define global strategy. Collaborate in highly cross-functional teams across multiple time zones.:
  - **Achievements:** Led the design and implementation of SAP information security testing framework across GSK Global ERP system. Supported senior leadership team in establishing and running the Center of Excellence (CoE) for GSK's enterprise-wide RPA strategy, resulting in over 100 process automation improvements.:

- **The Alan Turing Institute** London, UK.
  Core Developer *Feb 2024 - Present*
  Awarded Turing enrichment scheme placement award [8] a 12 month programme for Doctoral students to spend time at the Turing. I then continued my affiliation with the Turing as a core developer of Scivision, an open-source computer vision package designed at the Turing.

  - **Responsibilities:** Core developer of Scivision[9] an open-source computer vision package developed at The Alan Turing Institute. Design and develop code for improving automation and deployment, testing frameworks and Docker implementations.:
  - **Achievements:** Implemented several CI/CD methods to improve maintenance of scivision catalog. Designed and implemented Docker solutions for multiple scivision models resulting in a considerable reduction in setting up of model environments for different user systems.:

  Enrichment Student *Jan 2022 - Jan 2023*
  - **Responsibilities:** Contribute ideas and code for improving Scivision functionality as well as further building the community of developers and users to improve the adoption of Scivision. Research and collaborate with other Turing Fellows and enrichment students to improve my Ph.D research.:
  - **Achievements:** Pitched Scivision at The Alan Turing Institute Artificial Intelligence UK (AIUK) conference 2023 PitchFest competition [10]. Planned and facilitated an all-day workshop on Uncertainty Quantification for Generative Models at The Alan Turing Institute inviting world-leading guest speakers from Google DeepMind, Microsoft and The Alan Turing Institute to facilitate collaboration and discussion of the latest developments within this field.:

- **University of Birmingham** Birmingham, UK.
  Teaching Associate *Sep 2021 - Present*
  - **Responsibilities:** Supporting undergraduate and postgraduate students on Data Structures & Algorithms, Artificial Intelligence, Computer Vision & Imaging, Neural Computation, Visualisation and Software Engineering & Professional Practises modules. :
  - **Achievements:** Designed and delivered multiple Jupyter notebook-based exercise workshops for different modules.:

- **Doctor Care Anywhere** London, UK
  Analyst *Jan. 2016 - Dec. 2016*
  - **Business Operations**: Data exporting, manipulation and conversion in order to support a range of client set-ups.

  - **Business Analytics**: Delivery of Data analysis and reporting (e.g. ad-hoc requests) using a combination of AdvancedExcel, FetchXML, SQL and Power BI.

EDUCATION

- **Ph.D. Computer Science** Nov. 2020 – Present (Nov. 2024)
  University of Birmingham *Birmingham, UK.*
  - **Focus**: Generative modeling approaches to multimodal image-to-image translation bioimaging tasks and approaches to quantifying uncertainty in generative models.
  - **Advisors**: Prof. Iain Styles [11] Dr. Alexander Krull [12] & Dr. Minh Doan [13]

- **M.Sc Business Analytics; Distinction** Sep. 2018 – Aug. 2022
  Imperial College Business School *London, UK.*
  - **Focus**: Deep learning for image analysis, ML, Statistics and Optimisation & Decision Models

- **BA Business & Management; 1st Class Honors** Sep. 2011 – Aug. 2014
  University of Portsmouth *Portsmouth, UK.*

Skills

- Python, Pytorch, Tensorflow, CUDA, sklearn, Matplotlib, Inkscape and Slurm.

Awards, Workshops & Invited Talks

- **Data Science in Production with Python [14]**: 2-day course from Cambridge Spark focused on productionising ML pipelines.

- **Uncertainty Quantification for Generative Models [15]**: Independently planned and facilitated an all-day workshop at The Alan Turing Institute inviting 4 guest speakers (Google DeepMind, Microsoft, The Alan Turing Institute) and a round table discussion of the latest developments within the field.

- **"Evaluation of virtual stain models for high-throughput screening" [16]**: talk given at International Symposium for Biological Imaging (ISBI) 2023

Selected Publications

1. **Samuel Tonks**, Chih Hsu, Steve Hood, Ryan Musso, Ceriden Hopely, Minh Doan, Erin Edwards, Alexander Krull, and Iain Styles. Evaluation of virtual staining for high-throughput screenings. In 20th IEEE International Symposium on Biomedical Imaging. IEEE, 2023. [17]

2. Alexander Krull, Hector Basevi, Benjamin Salmon, Andre Zeug, Franziska Müller, **Samuel Tonks**, Leela Muppala, and Aleš Leonardis. "Image denoising and the generative accumulation of photons." In Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision, pp. 1528-1537. 2024.[18]