Curriculum Vitae - Matouš Elphick

Personal details and weblinks

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Summary statement

Currently in the third year of a four-year B.Sc. degree in *Computer Science with an Industrial Placement* at Newcastle University, and as part of my course I am doing a year-long research placement in the Electron Microscopy Science Technology Platform at the Francis Crick Institute. I am seeking a summer research placement in Computational Biology, Machine Learning/Artificial Intelligence and Data Science.

Education

Newcastle University: 2020 – 2024

- B.Sc. Computer Science with Industrial Placement.
- Year 2 – (mean mark 76%; first-class) including modules on 'Security & Programming Paradigms & Algorithm Design' and 'Software Systems Design & Implementation'.
- Year 1 - (mean mark 85%; first-class) including modules on 'Fundamentals of Computing', 'Computer Systems Design & Architectures' and 'Information Storage & Retrieval'.

Langley Park School for Boys, Beckenham: 2016 – 2020

- History (A), Economics (A), Computer Science (B).
- Eight GCSEs including Mathematics and English.

Related Experience

Francis Crick Institute, Electron Microscopy Science Technology Platform: July 2022 - present

- Year-long research placement in the group of Dr. Lucy Collinson, working under the supervision of Dr. Martin Jones (https://www.crick.ac.uk/research/platforms-and-facilities/electron-microscopy).
- Developing a plugin for napari that uses machine learning techniques such as random forests and gradient boosting to automate the targeted analysis and segmentation of mitochondrial cristae in volume electron microscopy images.
- Collaborating with the Zooniverse Etch-a-Cell Project (https://www.zooniverse.org/projects/h-spiers/etch-a-cell-demolition-squad) where we are asking citizen scientists to manually segment organelles in volume electron microscopy data so as to create a comprehensive 3D model of the target organelle. This model can then be used to train an artificial neural network to automate the task of segmentation. I am responsible for the formatting, pre-processing and uploading of all volume electron microscopy data to be segmented by the citizen scientists.
- Assisting the TRACERx Renal Project (http://tracerx.co.uk/studies/renal/) with Dr. Charlotte Spencer in Dr. Samra Turajilic's group (https://www.crick.ac.uk/research/labs/samra-turajlic). We are using histopathology pattern annotations from whole slide images to understand the somatic evolution of clear cell renal cell carcinoma and the pathways for it becoming metastatic.
- Developing a course alongside Dr. Martin Jones and Rocco D'Antuono to teach scientists at the Crick how to use and develop plugins for the python based multi-dimensional image viewer napari.

Queen Mary University of London, School of Biological & Behavioural Sciences: June 2021 - September 2021

- Research placement in the group of Dr. Alex de Mendoza (https://www.demendozalab.com/) investigating the comparative epigenomics and evolution of DNA methylation in eukaryotes. This involved use of a range of bioinformatics and computational tools and creating tools to process large

amounts of DNA sequence data. For example, to search a csv file with thousands of orthogroups and create a species distribution matrix and then use this matrix to generate a heatmap showing presence and absence of a species in an orthogroup.

Additional Experience

Student Ambassador, Faculty of Science, Agriculture & Engineering, Newcastle University: Sept. 2021 – June 2022

- This involved i). assisting prospective students in understanding the benefits of attending university, ii). assisting the faculty in recruiting students. iii). giving campus tours for students and parents, providing an insight to university life, while acting in a professional manner.

Newcastle University Wildcats Ice Hockey Club, Social Secretary: Sept. 2021 – June 2022

- Organisation and promotion of weekly socials and large seasonal parties such as Winter Ball and End of Year Ball.
- Securing and maintaining relations between the Club and external sponsors.

Specific skills and activities in computing

Public speaking - Presented my research on automating the analysis of mitochondrial cristae in volume EM data at the *Society of Electron Microscopy Technology* meeting at Natural History Museum, Dec. 7th, 2022.
Coding - Proficient in use of Python, Java and C programming languages. Well versed in version control application GitHub and have experience of debugging and testing large projects.
Web development - As an extension of my A-level project, I created the website *Bioloop* (https://bioloop.azurewebsites.net), which is a suite of bioinformatics and computational biology tools written in Python. The source code can be found on GitHub (https://github.com/MatousE/spirala).
Machine Learning/Artificial Intelligence - Theoretical and practical understanding of a range of machine learning and deep learning techniques such as gradient boosting, random forests and convolutional neural networks.
University of Oxford Bebras Challenge *(http://www.bebras.uk/)* – Distinction (Elite Group, 2019)
Member of Newcastle University Computer and Technology Society

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Interests

Listening to and playing music – I play several instruments, including guitar, bass, piano.
Ice skating and ice hockey - I play ice hockey for the *Newcastle Wildcats*.

References

Dr. Martin Jones, Electron Microscopy Science Technology Platform, The Francis Crick Institute, London NW1 1AT.
E-mail: Martin.Jones@crick.ac.uk

Dr. Alex de Mendoza, School of Biological & Behavioural Sciences, Queen Mary University of London London E1 4NS.
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