Joseph Rance

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I am a Computer Science student at Cambridge University, about to begin my second year. I love how simple mathematical rules can create complex systems that learn to "think" in a way similar to how a human would think in order to produce elegant solutions for real world problems.

Education

University of Cambridge
BA COMPUTER SCIENCE (2021-2024). Class I in first year
Modules covered in year 1: Databases, Digital Electronics, Discrete Maths, OCaml, Graphics, Java, Scientific Computing, Maths, Algorithms, Machine Learning and Real-world Data, Operating Systems, Interaction Design, Probability, Software and Security engineering

Colchester Royal Grammar School
A LEVELs (2021) A*A*A*A*A in Maths, Further Maths, Physics, Computer Science, EPQ
GCSEs (2019) 9999999776A* in Maths, Physics, Computing, Chemistry, Biology, French, Tech., Art, Eng. Lit., Eng. Lang., F. Maths

CyberFirst advanced programme
Two week course on computer security with a CTF at the end (Summer 2020)
SCQF level 6 qualification standard

Experience

Research internship
University of Cambridge Computer Laboratory (Summer 2022)
I am working on implementing backdoors into Machine Learning models and investigating how these backdoors can be inserted using preprocessing techniques such as GAN-based preprocessing.

Projects

Deutsche Bank, AI4Good Hack from Home
Worked with the ai4good organisation to create a set of algorithms to simulate the spread of coronavirus in refugee camps.

Robotic arm with object detection
Coordinated a project to write an unsupervised object detection algorithm for a robotic arm as part of my school's student run computing society. Link to GitHub

Generating images using a VAE-GAN
Generated images of faces using a VAE combined with a GAN to achieve a more semantic loss function than the usual pixelwise distance metric for a VAE. I trained the model on a gathered by automatically cropping faces from images on the internet. Link to code

Reinforcement Learning to improve decision making in the sport of fencing
Worked on developing a set of machine learning algorithms to generate tactical policies for the sport of fencing. Created 3 different agents to learn from data gathered about my own competition bouts and generated predictions to learn about how I can improve decisions I make during matches. Link to code

Google CodeIn 2019
Completed 10 tasks in total (9 for TensorFlow; 1 for Appertium). Link to code

Skills

I have substantial experience programming in Python (numpy, TensorFlow/Keras, pytorch/Lightning, ...), Java, C#, SQL, OCaml, as well as experience with Git and Autodesk Inventor.

Awards and achievements

Arkwright scholarship (2019-2021)
This prestigious engineering scholarship was awarded to me after a rigorous selection process, providing a financial award to support my studies.

UKMT Team Maths Challenge
Represented my school in the UKMT Team Maths Challenge in 2020 placing 2nd in the region.

Jack Petchey Achievement award
Received the award for leading and developing the school's Sixth Form's Computing Society during lockdown though online tutorials, talks, debates and challenges (2019-2021). Link to GitHub

Achievements in the sport of fencing
Represented England for under 17 men's foil in Paris and am ranked 23rd in Great Britain for under 20 men's foil. I am currently the Eastern Region Senior champion.