

Conor Cosnett

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Education

- 2019-2020 NATIONAL UNIVERSITY OF IRELAND, GALWAY (HDip in Applied Mathematics)
- **Project:** Created a SAT solver recipe book. Provided recipes to encode John Conway's Game of Life in Boolean logic and investigated the "Boolean Satisfiability Problem" in this context.
 - **First Class Honours** with final overall grade of 83%
- 2012-2018 NATIONAL UNIVERSITY OF IRELAND, GALWAY (BSc Physics with Applied Physics)
- **Final Year Project:** Developed an exoplanet detection system using a Convolutional Neural Network: Used **transfer learning** to repurpose a pretrained instance of the Google Inception V3 to classify direct imaging sequences.
 - **First Class Honours** with final overall grade of 75%
 - Second highest mark from class of 38 students
 - School of Physics Third Year Laboratory Gold Medal
- 2006-2012 ROYAL SCHOOL CAVAN
- Achieved 550 points in leaving certificate (Top 5% for that year)

Research Experience

- Summer 2018 APPLIED OPTICS GROUP, NUIG
- Extended an exoplanet "detection system" developed in (undergraduate) final year project to a "detection and localisation system".
 - Documented the project in the style of a journal article (available on request).
 - Carried out further experimental work:
 - Replaced the Google Inception V3 (2D) CNN based classifier with a 3D convolutional neural net.
 - Compared the two classifiers using Receiver Operating Characteristic curves.
 - Demonstrated speckle (optical noise) removal from direct imaging sequences using an Autoencoder.
- Summer 2017 APPLIED OPTICS GROUP, NUIG
- Took steps toward learning about the subject of detecting exoplanets within. direct coronagraph image sequences. This is where the starlight is blocked out by an optical instrument called a coronagraph.
 - In order to clarify this subject we started off with a simple proof of concept. We randomly added faint Gaussians to sequences of images of noise.
 - * From this we made a simple training set which we tried on an off the shelf neural network (built into Mathematica).
 - We found that the neural network could easily discern the Gaussian (even in the presence of significant noise).
 - In the last two months we extended the simple classifier (more realistic training data (PeX simulator)).

- Finally, investigations were carried out towards building a Neural Network from lower level code using the Python Library, TensorFlow.
- Built a triple GPU computer to experiment efficiently with TensorFlow

Bachelors course work that involved mathematics relevant to AI

- Mathematical Modelling I (93%)
- Mathematical Modelling II (88%)
- Mathematical Methods I (75%)
- Mathematical Methods II (81%)
- Wave Optics (88%)
- Electromagnetism (86%)
- Quantum Mechanics (76%)
- Quantum Physics (72%)
- Electronics (74%)
- Signal Analysis (70%)
- Lasers and Spectroscopy (71%)
- Solid State Physics (71%)

Massive Open Online Courses

- Coursera: Introduction to Logic, Michael Genesereth
- Coursera: Probabilistic Graphical Models, Daphne Koller
- Coursera: Introduction to Mathematical Thinking, Keith Devlin
- Coursera: Machine Learning: Andrew Ng
- edX: Linear Algebra - Foundations to Frontiers, Robert van de Geijn
- edX: Introduction to Computer Science and Programming Using Python
- edX: MITx: 6.041x Introduction to Probability - The Science of Uncertainty
- Youtube: Machine Learning, Pedro Domingos (did not get certificate)

Programming Skills

- Mathematica
- MATLAB
- Prolog
- Unix Shell
- Python
- C
- Emacs (text editor of choice)

Non Physics Books studied

- The Master Algorithm (Pedro Domingos)
- Artificial Intelligence: A Modern Approach (Russell and Norvig (14 chapters so far))
- Markov Logic: An interface Layer for AI. (Domingos and Lowd)
- Augmenting Human Intellect (Douglas Engelbart (1962))
- Deep Learning (Goodfellow and Bengio)
- Gödel Escher Bach. (Douglas Hofstadter)
- Exact Thinking in Demented Times: The Vienna Circle (Karl Sigmund)

Interests

- History of Science
- Artificial Intelligence
 - Virtual Assistants
- Learning Russian as a Hobby
- Intelligence Augmentation
 - Human Computer Interaction
 - * Stenotypy