James O' Neill

jamesoneill12.github.io • james.o-neill@liverpool.ac.uk • +44 75 867 09555
Brannockstown, Naas • Kildare, Ireland W91F5Y9

Education

- **University of Liverpool**   **Liverpool, UK**
  College of Computer Science, Ph.D. Natural Language Processing   *03/2018 – Present*

  - My PhD work mainly focuses on neural network compression and improving neural network training efficiency. During my PhD, I have been a Teaching Assistant for *Machine Learning*, *Complex Information and Social Networks*, *Python Programming* and *Java Programming* courses.

- **National University of Ireland**   **Galway, Ireland**
  Department of Engineering and Informatics   *08/2016 – 02/2018*

  - MSc in Computer Science (Major in Data Analytics).
  - Grade: 84.5%, Thesis: Cardiovascular-Related Mortality Classification 86% (published)

- **National University of Ireland**   **Maynooth, Ireland**
  Department of Electronic Engineering   *09/2010 – 06/2014*

  - Bachelor Degree in Electronic Engineering
  - Grade 2:2, Thesis: Non-invasive Anaerobic Threshold Determination using Fuzzy Model Interpolation (published)

Experience

- **Huawei Natural Language Processing Research Team**   **Dublin, Ireland**
  Research Scientist (Virtual) Internship   *03/2020 – 8/2020*

  - During this internship I carried out two research projects: (1) improving fine-tuning of pretrained cross-lingual language models using our proposed gradient sparsification methods and (2) compressing cross-lingual language models using neuron correlation pruning.

- **Amazon Core Search NLP Team**   **Tokyo, Japan**
  Applied Scientist (Virtual) Internship   *09/2020 – 12/2020*

  - This was a returning internship where I built upon worked done in the previous internship. I extended counterfactual detection and negation scope detection classification models to filter irrelevant text in languages such as German and Japanese. These models were tested and trialed in the core search production system.

- **University of Southern California, Information Sciences Institute (ISI)**   **Los Angeles, California, USA**
  Machine Learning Internship in the MINDS Group   *06/2019 – 09/2019*

  - During this internship I worked on reducing label dependency for computer vision and natural language processing tasks. Specifically, I focused on novel model compression techniques of very deep neural networks, namely *layer fusion*. This approach showed layers of popular architectures such as Residual networks and Transformers can be merged and combined in a structured way such that network density is intact while reducing network size.

- **Amazon Core Search NLP Team**   **Tokyo, Japan**
  Applied Scientist Internship   *09/2019 – 12/2019*

  - I worked on two main projects during my Amazon internship on the Core Searcn NLP team: (1) multimodal text generation for question answering and abstractive text summarization and (2) counterfactual detection from customer reviews.

- **University of Liverpool**   **Liverpool, UK**
  Part-time Research Assistant   *05/2018 – 08/2018*

  - As a part of the Small Animal Veterinary Surveillance Network (SAVSNET) project, I aimed at identifying tick parasitism in small animals (e.g dogs and cats) from a million veterinary medical notes, 30,000 of

which are annotated by veterinary practitioners. Best classification results were achieved using an ensemble of bidirectional GRU networks that combined pretrained word embeddings and in-domain character embeddings.

- **Insight Centre for Data Analytics**   **Galway, Ireland**
  Research Scientist   *08/2016 – 02/2018*

    - Created Python API's for legal text classification, topic modelling and information retrieval.
    - Worked on a legal text-based natural language project, supported PhD students, peer-reviewed papers submitted to top conferences (EACL, ACL, EMNLP) and partially wrote draft EU project proposals.
    - Carried out research on learning word similarity and word relatedness using pairwise learning architectures and transferability between both.

- **National University of Ireland**   **Galway, Ireland**
  Machine Learning and Data Mining Group   *08/2015 – 09/2015*

    - Thesis: "Classifying Cardiovascular Mortality Events using ABPM Measurements in a Hypertensive Population" (`https://www.dropbox.com/s/vnnjg1epwn9o5jm/Final_Thesis_New_JamesONeill.pdf?dl=0`). This entailed classifying patients at risk of morbidity based on patient details and Ambulatory Blood Pressure Monitoring (ABPM) measurements, highlighting the importance of out of clinic measurements in inference.

- **National University of Ireland**   **Maynooth, Ireland**
  Assistive Technology Intern, Electronic Engineering Department   *01/2012 – 05/2012*

    - This project involved using Texas Instrument microcrontrollers to assist physically disabled people by changing the state of electronic devices with constrained limb motion e.g turning on a radio or tv and changing channel based on different motions.

Certificates and awards

- PhD Scholarship   *03/2018 – Present*
- Highest overall MSc grade (including highest Thesis mark)   *2016 – 2017*
- Andrew Ng Coursera Course – Machine Learning   *10/2015 – 12/2015*

Languages and Technologies

Programming Languages: Python (most practiced), R, C++, Java, LaTeX, SPARQL
Technologies: SciPy, NumPy, PyTorch, GNumpy, Keras, JAX, scikit-learn, NLTK, CoreNLP, Django/Django-REST, Spacy, Gensim, MALLET, Weka, Git

Selected Publications

1. **James O' Neill**, Polina Rozenshtein, Ryuichi Kiryo, Motoko Kubota and Danushka Bollegala: *I Wish I Would Have Loved This One, But I Didn't–A Multilingual Dataset for Counterfactual Detection in Product Reviews*, Proceedings of the 2021 Conference on Empirical Methods in Natural Language Processing (EMNLP). (2021)

2. **James O' Neill**, Paul Buitelaar (2018). Few-Shot Transfer Learning Between Word Relatedness and Word Similarity using Siamese Networks. 32nd *AAAI Conference on Artificial Intelligence*.

3. **James O' Neill**, Aram Galstyan and Greg Steeg, *Layer-Wise Neural Network Compression via Layer Fusion*, 13th Asian Conference on Machine Learning (ACML). (2021)

4. **James O' Neill and Danushka Bollegala** Meta-Embedding as Auxiliary Task Regularization (2020). 24th *European Conference on Artificial Intelligence (ECAI)*.

5. **James O' Neill** and Danushka Bollegala Learning to Evaluate Neural Language Models (2019). 24th *Conference of the Pacific Association for Computational Linguistics (PACLING)*.

6. **James O' Neill**, Paul Buitelaar, Cecile Robin, Leona O' Brien (2017). Classifying Sentential Modality in Legal Language: A Use Case in Financial Regulations, Acts and Directives. *International Conference of Artificial Intelligence and Law* (ICAIL).

7. John V. Ringwood, **James O' Neill**, Peter Tallon, Neil Fleming and Bernard Donne, (2014). Non-invasive anaerobic threshold measurement using fuzzy model interpolation. *In Control Applications (CCA), 2014 IEEE Conference on (pp. 1711-1715). IEEE.*

8. **James O' Neill**, Sourav Dutta and Haytham Assem, Self-Distilled Pruning Of Neural Networks (2021). (under review at ICLR)

9. **James O' Neill**, Sourav Dutta and Haytham Assem, Gradient Sparsification Methods For Improve Fine-Tuning of Transformers (2021). (under review AAAI)

10. **James O' Neill**, Sourav Dutta and Haytham Assem, *AlignReg*: Weight Regularizers for Improving Zero-Shot Pruning (2021). (under review AAAI)

11. **James O' Neill** and Danushka Bollegala, Conditioned Negative Sampling for Efficient Metric Learning (2020)

12. **James O' Neill**, An Overview of Neural Network Compression (2020)

13. **James O' Neill** and Danushka Bollegala Transfer Reward Learning for Conditional Text Generation (2019)

14. **James O' Neill** and Danushka Bollegala Error-Correcting Neural Language Models (2019)

15. **James O' Neill** and Danushka Bolllegala, Curriculum-Based Neighborhood Replacement Sampling For Sequence Prediction (2018).

16. **James O' Neill** Siamese Capsule Networks (2018). arXiv preprint arXiv:1805.07242.

17. **James O' Neill** (2018). Learning to Avoid Negative Transfer Learning. arXiv preprint arXiv:1804.08501.

Services to the community

- **Reviewer for conferences:** ACL 2020/2019, EMNLP 2020/2019/2018, AAAI 2019/2018, EACL 2017

- Mentored and supervised 3 Masters students and a 1st year PhD student while working as a Research Assistant.

- Overview Paper of Recent Regularization Methods and Techniques, aimed at aiding ML practitioners stay up to date with advances over the past decade.

Talks

- Huawei, Dublin, Ireland - Fine-pruning cross-lingual language models and gradient sparsification techniques for efficient fine-tuning.

- Amazon, Tokyo, Japan - Multilingual Counterfact Detection & Negation Scope Detection

- Amazon, Tokyo, Japan - Multi-Modal Universal Representations for Conditional Text Generation.

- University of Southern California, Information Sciences Institute (USC-ISI) - Overview of PhD work (Nearest Neighborhood Replacement Sampling for Sequence Prediction & Semi-Supervised Meta Embedding)

- USC-ISI - Presentation of my 2019 summer internship project, "Compressing Deep Neural Networks via Layer Fusion"

- NLP Group at University of Liverpool (2018): Mitigating Compounding Errors In Language Modeling, Reward Augmented Maximum Likelihood and Graph Neural Network Classification.

- 32nd Conference AAAI Conference at New Orleans: Few-Shot Transfer Learning Between Word Relatedness and Word Similarity Tasks

- IBM Dublin, 2017: Recurrent Neural Networks for Legal Text Mining

- ICAIL London, 2017: Sentential Modality Classification in the Legal Domain.