Nishant Subramani

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Work Experience

- **Machine Learning Research Scientist | Scale AI** April 2020 – December 2020
  - Research Tech Lead & ML Lead on Scale Document.
  - Mentored junior researchers to be a part of their first ML paper submission to a major conference.
  - Built multi-task optical character recognition & document intelligence models, beating Google, Amazon, and other vendors, which landed a $500k corporate models as a service (MaaS) contract and started our MaaS product offering.
  - Wrote document understanding survey paper which was accepted to the MLRSA workshop at NeurIPS 2020.
  - Developed algorithms to condition transformer language models to generate unseen sentences, paper under review.
  - Created a natural adversarial objects dataset to improve robustness of object detection systems, paper under review.
- **Research Scientist | AI Foundation** July 2019 – January 2020
  - Built a sample- and memory-efficient multi-task fake speech detection system and published at AAAI20.
  - Created a large, diverse fake speech dataset to improve internal fake speech detection systems.
  - Developed an audio-driven facial animation model, which made AI rendered puppets more realistic.
  - Evaluated the efficacy of different sentence representation methods for question-answer retrieval in dialog.

Education

- **Courant Institute of Mathematical Sciences | New York University** Sept 2017 – May 2019
  - **M.S. Computer Science** (Deep Learning & NLP) GPA: 3.8/4.0
  - **Research Advisors:** Kyunghyun Cho and Sam Bowman
  - **Graduate Courses**: Deep Learning, Deep Generative Models, Deep Learning for NLP
- **Northwestern University** Sept 2013 – June 2017
  - **B.A./M.S. Statistics/Computer Science**; Stat GPA: 4.0/4.0; MS GPA: 4.0/4.0
  - **Research Advisor:** Doug Downey
  - **Graduate Courses**: Deep Learning, Machine Learning Foundations, Probabilistic Graphical Models, Data Mining, Adv Topics in ML, Statistical Pattern Recognition, Computational Learning Theory, Adv Topics in Bayesian Stats

Publications (with embedded links)

1. **Subramani, Nishant** and Nivedita Suresh. "Discovering Useful Sentence Representations from Large Pretrained Language Models" **Under Review at NAACL 2021**
2. Lau, Felix, Rosanne Liu, **Nishant Subramani**, Alexandra Harrison, Aerin Kim, and Elliot Branson. "Natural Adversarial Objects" **Under Review at CVPR 2021**
3. **Subramani, Nishant**, Alexandre Matton, Malcolm Greaves, and Adrian Lam. "A Survey of Deep Learning Approaches for OCR and Document Understanding" **MLRSA Workshop at NeurIPS 2020**
4. **Subramani, Nishant** and Delip Rao. "Learning Efficient Representations for Fake Speech Detection" **AAAI 2020**
5. **Subramani, Nishant**, Samuel R. Bowman, and Kyunghyun Cho. "Can Unconditional Language Models Recover Arbitrary Sentences?" **NeurIPS 2019**
6. **Subramani, Nishant**. "Pag2admg: An Algorithm for the Complete Causal Enumeration of a Markov Equivalence Class" **ICML 2018 CausalML Workshop**.
7. **Subramani, Nishant**, and Doug Downey. "PAG2ADMG: A Novel Methodology to Enumerate Causal Graph Structures" **AAAI 2017 Student Abstract**
8. **Subramani, Nishant**. "Identifying the Best Predictors of Unmet Health Care Needs in Children with DBD." *Northwestern Undergraduate Research Journal* (2015).

Research Experience

- **Research Collaborator | Allen Institute for AI** October 2020 – Present
  - Working with Doug Downey and Daniel King on scientific concept generation models from scientific papers with the Semantic Scholar team.
- **NLP Researcher | Masakhane** May 2020 – Present
  - Co-organizing the AfricaNLP 2021 workshop. **Accepted at EACL2021**
- **Research Assistant | New York University** September 2017 – May 2019
  - Advised by Kyunghyun Cho and Sam Bowman.
  - Developed a framework to analyze the sentence space of a recurrent neural language model.
  - Built a pipeline to investigate using a language model as a universal decoder for multitask natural language generation.
- **Deep Learning Research Intern | Salesforce Research** March 2017 – August 2017
  - Supervised by Richard Socher
  - Built a multitask NLP system trained end-to-end for a vareity of NLP tasks.
  - Investigated impact of CoVe pretraining on state of the art abstractive summarization and question answering models.

- **Research Assistant | Northwestern University** July 2014 – March 2015; March 2016 – June 2017
  - Advised by Doug Downey.
  - Improved my *pag2admg* algorithm developed at ETH Zurich into a method that generates all Markov equivalent acyclic directed mixed graphs (not necessary just ancestral) from a PAG.
  - Developed various methodologies to identify deep net hyperparameter settings more efficiently using active learning and sampling.
  - Developed various ensembling methodologies to improve state-of-the-art language model performance on the Penn Tree Bank dataset.
  - Developed alternative dropout methodologies to increase variance of models from epoch to epoch to improve deep neural network performance on a variety of tasks.
  - Developed methods to input pre-existing analogical knowledge to improve word-embeddings in Google's word2vec models.
  - Developed methods to utilize importance sampling to help stochastic gradient descent convergence for neural sentence-level language modeling.
- **Research Assistant in Biomedical Informatics | Stanford University** Jun 2015 – Jan 2016
  - Supervised by Olivier Gevaert
  - Developed a Bayesian Network structure learning methodology to identify a genetic basis for Glioblastoma.
- **Research Assistant in Biomedical Informatics | Feinberg School of Medicine** Jan 2016 – March 2016
  - Supervised by Yuan Luo
  - Predicted ICU 30-day readmission rates from a multivariate panel of physiological measurements using Subgraph Augmented Non-Negative Matrix Factorization (SANMF).
- **Master's Semester Project Student in Systems Biology | ETH Zurich** Sept 2015 – Jan 2016
  - Supervised by Manfred Claassen
  - Developed a methodology (*The Boundary Searcher*) to efficiently calculate the r-convex hull of a point cloud in high dimensions.
- **Master's Semester Project Student in Statistics | ETH Zurich** Sept 2015 – Jan 2016
  - Supervised by Marloes Maathuis
  - Developed a novel methodology to transform a given partial ancestral graph (PAG) to the set of all ancestral acyclic directed mixed graphs that belong in the Markov equivalence class that the PAG encodes.

Teaching Experience

- **Teaching Assistant for Natural Language Understanding | NYU** Jan 2018 – May 2018
  - Graduate Course: DSGA-1012 - Natural Language Understanding.
  - Gave a lecture on deep learning fundamentals for NLU.
  - Developed homework assignments and ran the tutorial sessions of the course.
  - Helped advise research projects completed by students in the course that involved deep learning applied to language.
- **Teaching Assistant for Statistical Language Modeling | Northwestern** Jan 2017 – Mar 2017
  - Graduate Course: EECS 496 - Statistical Language Modeling focusing on Deep Learning.
  - Constructed seminar reading list; helped other students understand seminal deep NLP papers.
- **Teaching Assistant for Probabilistic Graphical Models | Northwestern** Sept 2016 – Dec 2016
  - Graduate Course: EECS 495 - Probabilistic Graphical Models.
  - Helped to design course materials and structure for this graduate course.
  - Developed and graded assignments; held office hours.
- **Teaching Assistant for Mathematical Foundations of CS | Northwestern** Sept 2016 – Dec 2016
  - Undergraduate Course: EECS 212 - Mathematical Foundations of Computer Science.
  - Helped to develop and grade assignments and exams; held office hours.
- **Teaching Assistant for Machine Learning | Northwestern** Feb 2016 – June 2016
  - Undergraduate/Graduate Course: EECS 349 - Machine Learning.
  - Devised methodology for and built a mechanical TA which uses the Vancouver crowd sourcing algorithm.
  - Helped to design tree search and decision tree assignments, graded assignments, and held office hours.
- **Co-Instructor for Computing Applications I & II | Northwestern** Sept 2014 – March 2015
  - Undergraduate Courses: ISP 101-1, 101-2 - Computing Applications I/II.
  - Co-taught course with three other teaching assistants.
  - Wrote exam questions and assignments covering python and R basics.

Other Experience

- **Deep Learning Consultant | Talkspace** November 2017 – August 2018
  - Taught Talkspace's Data Science team about deep learning fundamentals and helped build domain-specific models.

Research Presentations

- ***A Survey of Deep Learning Approaches for OCR and Document Understanding.*** December 2020
  NeurIPS MLRSA Workshop 2020, Virtual. Talk.

- ***Can Unconditional Language Models Recover Arbitrary Sentences?*** March 2020
  SRI International, Menlo Park, CA. Talk.
- ***Learning Efficient Representations for Fake Speech Detection.*** February 2020
  AAAI 2020, New York, USA. Poster.
- ***Can Unconditional Language Models Recover Arbitrary Sentences?*** December 2019
  NeurIPS 2019, Vancouver, Canada. Poster.
- ***PAG2ADMG***. ICML 2018, Stockholm, Sweden. Causal ML Workshop. Poster. July 2018
- ***PAG2ADMG***. AAAI 2017, San Francisco, CA. Student Abstract Spotlight Talk. February 2017
- ***PAG2ADMG***. AAAI 2017, San Francisco, CA. Student Abstract Poster. February 2017
- ***Pag2Admg***. Undergraduate Research Expo, Northwestern University. Poster. June 2016
- ***The Boundary Searcher***. EECS Poster Fair, Northwestern University. Poster. Apr 2016
- ***Predicting Unmet Health Care Needs in Children with DBD.*** June 2015
  Undergraduate Research Expo, Northwestern University. Poster.
- ***Predicting Unmet Health Care Needs in Children with DBD.*** Mar 2015
  EECS Poster Fair, Northwestern University. Poster.
- ***How Evil are Turnovers?*** June 2014
  Undergraduate Research Expo, Northwestern University. Talk.
- ***How Evil are Turnovers?*** Apr 2014
  Computational Statistics Conference, Northwestern University. Poster.

Professional Service

- Program Committee Member for GEM Workshop at **ACL 2021** 2021
- Workshop Organizer for AfricaNLP at **EACL 2021** 2021
- Conference Reviewer for ACL 2021
- Conference Reviewer for CVPR 2021
- Conference Reviewer for AAAI 2020, 2021
- Conference Reviewer for ICML 2020
- Conference Reviewer for EMNLP 2019
- Conference Reviewer for ICLR 2019, 2020
- Conference Reviewer for ICCV 2017
- Conference Reviewer for NeurIPS 2017, 2020

Awards & Honors

- Henry M. MacCracken Graduate Fellowship (5 year fully-funded PhD Fellowship) September 2017 - May 2019
- Charles A & Ruby E Howell Endowed Scholarship December 2014 - June 2017
- Academic Dean's List September 2014 - June 2016
- Inaugural ETH Zurich Exchange Program Acceptee (1/3 students) September 2015 - February 2016
- Intel Science Talent Search (ISTS) Outstanding Written Report Award March 2013
- National AP Scholar August 2012
- REHSS High School Research Internship Acceptee (1/30 students nationwide) June 2012 - August 2012
- National Merit Commended Scholar December 2011