Nishant Subramani - *Aspiring Machine Learning Researcher*

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Objective

I am a PhD Student in Computer Science in the Courant Institute at New York University working on machine learning and deep learning advised by Kyunghyun Cho and Sam Bowman. Currently I am working multi-task learning, neural machine translation, importance-sampling for neural language modeling, and causality.

- **Research Interests:** Machine Learning, Deep Learning, Multi-Task Learning, Causality, Interventional and Counterfactual Reasoning.

Education

- **New York University** — New York, NY
  PhD Computer Science focusing on Machine Learning — Sept 2017 – Present
  - **Advisors:** Kyunghyun Cho and Sam Bowman
- **Northwestern University** — Evanston, IL
  B.A./M.S. Statistics/Computer Science; **Stat GPA:** 3.963/4.000; **MS GPA:** 4.000/4.000 — Sept 2013 – June 2017
  - **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
  - **Undergrad Courses**: Machine Learning, Intro to AI, Regression Analysis, Statistical Computing, Statistical Theory & Methodology I-III, Theory of Computation, Biochemistry, Cell and Molecular Biology

Publications

1. Subramani, Nishant, and Doug Downey. "PAG2ADMG: A Novel Methodology to Enumerate Causal Graph Structures" In *31st AAAI Conference on Artificial Intelligence*. 2017. **Student Abstract**
2. Subramani, Nishant. "Identifying the Best Predictors of Unmet Health Care Needs in Children with DBD." *Northwestern Undergraduate Research Journal* (2015).

Research Experience

- **PhD Researcher in Machine Learning** — New York University
  PIs: Kyunghyun Cho and Sam Bowman — September 2017 – Present
  - ****Project 1:** Working on natural language generation for machine translation, summarization, and image captioning. *Deep Learning, Neural Machine Translation (NMT), LSTMs, Attention*
  - ****Project 2:** Improving *pag2admg* algorithm into a more efficient method to generate all Markov equivalent acyclic directed mixed graphs. *Causality, Ancestral Graphs, Acyclic Directed Mixed Graphs, Markov Equivalence*
- **Deep Learning Research Intern** — Salesforce (Metamind Group)
  PI: Richard Socher — March 2017 – August 2017
  - **Project:** Worked on multitask learning, specifically trying to build a single system that could perform well on a myriad of NLP tasks *Deep Learning, MultiTask Learning, BiLSTMs, NLP, Meta-learning*
- **Research Assistant in Deep Learning & NLP** — Northwestern University
  PI: Doug Downey — July 2014 – March 2015; March 2016 – June 2017
  - **Statistics Bachelor's Thesis (Accepted to ICML 2018 Workshop on Causality)**: Improving my *pag2admg* developed at ETH Zurich into a method that generates all Markov equivalent acyclic directed mixed graphs (not necessary just ancestral) from a PAG. *Causality, Ancestral Graphs, Mixed Graphs, Markov Equivalence*
  - **Master's Thesis**: Developing various methodologies to identify deep net hyperparameter settings more efficiently using active learning and sampling. *Deep Learning, Hyperparameters, LSTMs, ConvNets, Active Learning*
  - **Project 3**: Developing various ensembling methodologies to improve state-of-the-art language model performance on the Penn Tree Bank dataset. *Deep Learning, Recurrent Neural Nets (RNNs), XGBoost*
  - **Project 4**: Developing alternative dropout methodologies to increase variance of models from epoch to epoch to improve deep neural network performance on a variety of tasks. *Deep Learning, Dropout, RNNs, ConvNets*
  - **Project 5**: Developed methods to input pre-existing analogical knowledge to improve word-embeddings in Google's word2vec models. *Neural Networks, Active Learning*
  - **Project 6** (Plan to Submit to EMNLP 2018 Workshop on Analyzing NNs for NLP)**: Developing methods to utilize importance sampling to help stochastic gradient descent convergence for neural sentence-level language modeling. *Neural Networks, Importance Sampling, LSTMs, SGD*
- **Research Assistant in Biomedical Informatics** — Stanford University
  PI: Olivier Gevaert — Jun 2015 – Jan 2016
  - **Project 1**: Used predictive models to identify a genetic basis for cellularity in brain cancer patients using gene expression and cellular pathology data. *Bayesian Networks, Structure Learning, Hierarchical Clustering*

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- **Research Assistant in Biomedical Informatics** — Feinberg School of Medicine
  PI: Yuan Luo — Jan 2016 – March 2016
  - **Project**: Predicted ICU 30-day readmission rates from a multivariate panel of physiological measurements using Subgraph Augmented Non-Negative Matrix Factorization (SANMF). *Non-Negative Matrix Factorization, Frequent Subgraph Mining*
- **Master's Semester Project Student in Systems Biology** — ETH Zurich
  PI: Manfred Claassen — Sept 2015 – Jan 2016
  - **Project**: Developed a methodology (*The Boundary Searcher*) to efficiently calculate the r-convex hull of a point cloud in high dimensions. *R-Convex Hull, Random Walk*
- **Master's Semester Project Student in Statistics** — ETH Zurich
  PI: Marloes Maathuis — Sept 2015 – Jan 2016
  - **Project**: 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. *Causality, Ancestral Graphs, Directed Graphs, Mixed Graphs*

Teaching Experience

- **Teaching Assistant for Natural Language Understanding (Grad Course)** — New York University
  DSGA-1012 — Jan 2018 – May 2018
  - Developed homework assignments and exercises throughout the course.
  - Helped advise research projects completed by students in the course that involved deep learning applied to language.
- **Teaching Assistant for Adv Topics in ML (Grad Seminar)** — Northwestern University
  EECS 395/495 — Jan 2017 – Mar 2017
  - Course Topic: Statistical Language Modeling focusing on Deep Learning.
  - Constructed seminar reading list, helping other students understand seminal deep NLP papers.
- **Teaching Assistant for Probabilistic Graphical Models (Grad Course)** — Northwestern University
  EECS 474 — Sept 2016 – Dec 2016
  - Helped to design course materials and structure.
  - Developed and graded assignments; held office hours.
- **Teaching Assistant for Mathematical Foundations of CS** — Northwestern University
  EECS 212 — Sept 2016 – Dec 2016
  - Helped to develop and grade assignments and exams; held office hours.
- **Teaching Assistant for Machine Learning** — Northwestern University
  EECS 349 — Feb 2016 – June 2016
  - 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.
- **Teaching Assistant for Computing Applications I & II** — Northwestern University
  ISP 101-1 & 101-2 — Sept 2014 – March 2015
  - Co-taught course with three other teaching assistants.
  - Wrote exam questions and assignments covering python and R basics.

Other Experience

- **Deep Learning Consultant** — Talkspace
  Hiring Manager: Bonnie Ray — November 2017 – August 2018
  - Taught Talkspace's Data Science team about deep learning fundamentals and how to implement deep neural network models for text.
  - Helped advise building and training deep neural network models for domain-specific problems with text.

Skills

- **Proficient Languages/Packages:** Python, R, PyTorch
- **Machine Learning Algorithms:** Deep Nets (RNNs, LSTMs, CNNs), Bayesian Networks, SVMs, Logistic Regression, Decision Trees, Random Forests
- **Other Computational Methods:** AdaBoost, Clustering (K-means, Hierarchical), Map-Reduce

Research Presentations

- ***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

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- ***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

- Delegate Reviewer for NIPS 2017 June 2017
- Delegate Reviewer for ICCV 2017 May 2017

Awards & Honors

- Henry M. MacCracken Graduate Fellowship (5 Year Fully Funded PhD Studies) September 2017 - August 2022
- $500 Conference Travel Grant from Courant Institute of Mathematical Sciences June 2018
- $500 Conference Travel Grant from Weinberg College of Arts & Sciences January 2017
- $500 Conference Travel Grant from Undergraduate Research Northwestern University January 2017
- Charles A & Ruby E Howell Endowed Scholarship December 2014 - June 2017
- Academic Dean's List September 2014 - June 2016
- Intel Science Talent Search (ISTS) Outstanding Written Report Award March 2013
- National AP Scholar August 2012

Students Advised

- Michael Chen - B.S. Student in Computer Science, Northwestern University November 2016 - Present
- Gautam Srinivasan - M.S. Student in Computer Science, New York University August 2018 - Present

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