

# AKHILA YERUKOLA

Natural Language Processing · Machine Learning

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## EDUCATION

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### Stanford University

Sept 2017 - June 2019

M.S in Computer Science

GPA: 3.76

*Specialization:* Artificial Intelligence, Information Management Analytics

*Research Interests:* Deep Learning for Natural Language Processing, with a focus on Language Generation and Semi/Weakly-Supervised Learning

*Relevant Coursework:* CS229 (Machine Learning), CS224n (NLP with Deep Learning), CS236 (Deep Generative Models), CS228 (Probabilistic Graphical Models), CS276 (Info. Retrieval, Web Search), STATS 315b (Modern Applied Statistics, Data Mining)

### National Institute of Technology Trichy (NITT), Tamil Nadu, India

2012 - 2016

B.Tech. in Computer Science and Engineering

GPA: 9.45

## EXPERIENCE

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### AI Research Engineer

Aug 2019 - now

*Samsung Research America (SRA)*, Mountain View, CA, USA

Supervisors: Hongxia Jin, Mason Bretan

- Working on data augmentation to generate diverse rephrases of utterances for voice-assistant NLU
- Proposed an architecture for unsupervised *fine grained aspect extraction* and *sentiment analysis* scalable across domains

### Graduate Research Assistant

Sept 2018 - July 2019

*Stanford University, Department of Computer Science*

Advisor: Christopher Manning

- Studied if and how *RNN language models* can “think ahead” and proposed a multi-task learning architecture to use this “future” information to improve language modeling
- Analyzed how large pretrained models do, and do not, improve *neural story generation*

### Sr. Machine Learning Intern

June 2018 - Sept 2018

*IBM Watson*, San Jose, CA, USA

Supervisors: Hau-wen Chang, Rama Akkiraju

- Improved Watson’s NLU services for English *Named Entity Recognition* model using semi-supervised learning

### Graduate Research Assistant

March 2018 - June 2018

*Stanford University, Biomedical Data Science and Medicine*

Advisor: Teri Klein

- Worked on dependency parsing of PubMed article abstracts to extract bio-medical relationships between Chemical-Gene and Chemical-Disease pairs

### Software Engineer

June 2016 - Aug 2017

*Microsoft R&D*, Hyderabad, India

- Built a *sentiment analysis* model on social media posts for the ‘Microsoft Social Engagement’ product, which improves social selling by leveraging social insights

- Developed an orchestration engine library for implementing a reliable actor-message pattern in publisher-subscriber applications for a high degree of concurrency crucial in modern day dense cloud deployments

## PUBLICATIONS

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- **Akhila Yerukola\***, Mason Bretan\*, Hongxia Jin. **Data Augmentation for Voice-Assistant NLU using BERT-based Interchangeable Rephrase** [Under Review]
- Abigail See, Aneesh Pappu\*, Rohun Saxena\*, **Akhila Yerukola\***, Christopher D. Manning. **Do Massively Pretrained Language Models Make Better Storytellers?** *Computational Natural Language Learning (CoNLL)*, 2019.

(\* equal contribution)

## RESEARCH PROJECTS

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### Data Augmentation for Voice-Assistant NLU using BERT-based Interchangeable Rephrase

*Akhila Yerukola\*, Mason Bretan\*, Hongxia Jin*

*Jan 2020 - Present*

- Introduced a data augmentation method based on byte pair encoding and BERT-like self attention model to rephrase existing spoken utterances whilst maintaining the original intent.
- Compared and evaluated this method with numerous augmentation techniques encompassing generative models such as VAEs and performance boosting techniques such as synonym replacement and back-translation.
- Performs strongly on downstream NLU tasks and in a user-study focused on utterance naturalness and semantic similarity [**under review**].

### Do Massively Pretrained Language Models Make Better Storytellers?

*Abigail See, Aneesh Pappu\*, Rohun Saxena\*, Akhila Yerukola\*, Christopher Manning* *Spring 2019 - Summer 2019*

- Compared the performance of large pretrained model GPT-2 to a state-of-the-art story generation Fusion model (Fan et al., 2018) using several automatic metrics to evaluate stories.
- Showed that GPT-2 conditions more strongly on context, is more sensitive to event ordering and generates more concrete words and named entities (compared to Fusion model).
- Demonstrated that repetition and genericness of models is mainly caused mainly by choice of decoding algorithm, not a lack of training data [**Accepted at CoNLL 2019**].

### How much do RNNs “think ahead”?

*Akhila Yerukola, Joyce Xu, Abigail See, John Hewitt, Christopher Manning* *Autumn 2018 - Winter 2019*

- Proposed a framework to probe RNNs to study where *future content* information is encoded, if any.
- Our analysis revealed that certain layers of a stacked-RNN contain more long-term information, RNNs form a general syntactic “plan” for at least a few upcoming tokens and can predict structures as lists and date formats.
- Explored the effect of multitask learning with this “future” information on language modeling behaviour.

### Collaborative Filtering based Recommender Systems

Undergraduate Thesis

*Akhila Yerukola, Lakshmi Manoharan, Sushma Kodati, Leela Velusamy* *Winter 2016 - Spring 2016*

- Tackled the sparsity problem in memory-based recommender systems caused due to insufficient transaction and feedback data.

- Proposed an algorithm which effectively utilized the unused singular ratings to reduce RMSE by 11.5% on MovieLens dataset and 17.36% on FilmTrust dataset.

## TEACHING EXPERIENCE

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- Course Assistant for CS224U (Natural Language Understanding), Spring 2019, with Professor Christopher Potts and Professor Bill MacCartney. Worked with a team of 10 CAs for 250+ students to refine and grade course assignments. Mentored 10+ student teams for the course project. Taught a lecture on “Probing black box models.”
- Course Assistant for CS229 (Machine Learning), Autumn 2018, with Professor Andrew Ng. Worked with a team of 30+ CAs for 850+ students to develop new assignments, refine and grade course assignments. Mentored 30 student teams for the course project.
- Volunteer Instructor for Delta, the web development club of NITT (undergraduate). Taught basics of C++, Java and Android application development for the first semester in 2015 and 2016.

## DEPARTMENTAL SERVICE

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- Member of the Stanford MSCS Admissions Committee, 2019. Reviewed student applications with faculty to select the incoming MS students for 2020.
- [Undergraduate] Editor of Bits and Bytes, the official newsletter of the Department of Computer Science and Engineering, NITT, 2016. Managed a team of 10 people to release a newsletter twice a month.
- [Undergraduate] Head of Public Relations, Vortex, Department of Computer Science and Engineering Symposium, NITT, 2016.

## AWARDS

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- Top 3 Projects Award, CS231n (Convolutional Neural Networks for Visual Recognition) 2018. We implemented an image classification model that is robust to black-box adversarial attacks. Awarded 2nd best project out of 200+ projects.
- Top 3 Projects Award, CS224n (NLP with Deep Learning) 2018. We studied adversarial attacks on Question Answering systems and devised methods to improve robustness. Awarded 2nd best project out of 145+ projects.
- Third Highest GPA Award, 2015. Awarded by the Department of Computer Science, NITT to the student with the 3rd highest cumulative GPA.
- Full undergraduate scholarship by Ministry of Human Resource Development (MHRD), India 2012-2016. The scholarship is awarded to the top 0.01 % of students in the All India Engineering Exam, 2012.
- International Award for Young People (Duke of Edinburgh Award) 2010. Awarded to participants satisfying tasks in categories of Community Service, Adventure, Skill and Physical Recreation.

## SKILLS

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<b>Software</b>	Python, PyTorch, Tensorflow, C++, C#, JavaScript, NodeJS (proficient) Java, MATLAB, Android SDK, HTML (intermediate)
<b>Languages</b>	English, Telugu (native) Hindi, Kannada, Tamil (basic)
<b>Extra-curricular</b>	Publicity team member, inter-college fest team organizers 2013-2016 Core Member, Delta, the web development club of NITT First place, volleyball at the annual inter collegiate sports meet, India 2013 Taekwondo red belt certified 2010