Ameet Deshpande

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Education

Princeton University — **Princeton, USA**
Ph.D. candidate in Machine Learning, GPA – 3.94/4 — *2019–present*
Advisor: Karthik Narasimhan
Research interests: Natural Language Processing for low-resource scenarios

Indian Institute of Technology Madras — **Chennai, India**
Bachelor of Technology, GPA – 9.73/10 — *2015–2019*
Senior Thesis: Leveraging Sentiment Analysis for Reinforcement Learning

Professional Experience

Allen Institute for Artificial Intelligence (AI2) — **Seattle, WA (Virtual)**
Student Research Intern — *Oct 2022–Jan 2023*

- Developed a cognitively inspired system (SPARTAN) for improved inference efficiency of NLP Models
- Improved throughput by over 90% on low-resource computational engines

IBM Research — **Yorktown Heights, NY**
Research Intern — *June 2021–Aug 2021*

- Worked with the question-answering team to develop a **continual learning system** using memory networks and adapters
- Adapted the system to **enable continued evolution** by customers without access to specialized hardware
- **Defended the patent** for our framework which performs on par with pre-trained models while using only 1% of the parameters

Microsoft India (R&D) Pvt Ltd. — **Hyderabad, India**
Software Engineering Intern — *May 2018–July 2018*

- Enabled **faster scale-in** and **scale-out** by **migrating** the core component of Microsoft Azure's Real Time VM Replication service (used for Business Continuity and Disaster Recovery–BCDR) to Azure Service Fabric, a **microservices framework**
- Improved **parallelization** by creating **consistent** and **exclusive** storage structures which facilitated the **migration** of the core
- **Reduced CPU usage by 57%** post hosting the service and achieved close to production performance

Wipro Limited — **Bengaluru, India**
Research Intern — *May 2017–July 2017*

- Achieved **higher accuracy** by using **hierarchical classification** (HC) instead of flat classification to organize documents
- **Induced hierarchies** in a semi-supervised setting by performing **term clustering** based on corpus and **WordNet** similarities
- **Authored** a white paper highlighting the **technical and business aspects** of Hierarchical Classification

Scholastic Achievements and Awards

- Received the **Princeton Graduate School Teaching Award** for significant contribution to undergraduate **teaching**
- Awarded the **CMC Prize** for securing **Branch Rank 2** among 61 students (B.Tech+Dual Degree) of CSE at IIT Madras
- Won the **Dr Dilip Veeraraghavan Memorial Award** awarded to the second topper in humanities courses at IIT Madras
- Won **silver medal** in the **International Chemistry Olympiad** 2015, Azerbaijan (representing India) contested by 80 countries
- **All India Rank - 122** in **JEE (Advanced) 2015**, taken by 1.3 million students (99.99 percentile) and **first** rank in Karnataka
- Received the government's **MCM scholarship** for being in the **top 10** out of 850 students admitted to IIT Madras in 2015

Publications and Preprints

* indicates equal contribution and **boldface** highlights my name. Please click on the title to view the paper.

Conferences, Patents, and Workshops

[1] *When is BERT Multilingual? Isolating Crucial Ingredients for Cross-lingual Transfer*
A. Deshpande, P. Talukdar, and K. Narasimhan
NAACL (2022).

[2] *Guiding Attention for Self-Supervised Learning with Transformers*
A. Deshpande and K. Narasimhan
Findings of EMNLP (2020).

[3] *CLEVR Parser: A Graph Parser Library for Geometric Learning on Language Grounded Image Scenes*
R. Saqur and **A. Deshpande**
Proceedings of Second Workshop for NLP Open Source Software (NLP-OSS), EMNLP (2020).

[4] *Leveraging Ontological Knowledge for Neural Language Models*
A. Deshpande and M. Jegadeesan
Proceedings of the ACM India Joint International Conference on Data Science and Management of Data (2019).

[5] *Figurenet: A deep learning model for question-answering on scientific plots*
R. Reddy, R. Ramesh, **A. Deshpande**, and M. M. Khapra
2019 International Joint Conference on Neural Networks (IJCNN) (2019).

Notable Preprints

[1] *SemSup-XC: Semantic Supervision for Zero and Few-shot Extreme Classification*
P. Aggarwal, **A. Deshpande**, and K. Narasimhan
arXiv preprint arXiv:2301.11309 (2023).

[2] *SPARTAN: Sparse Hierarchical Memory for Parameter-Efficient Transformers*
A. Deshpande, M. A. Sultan, A. Ferritto, A. Kalyan, K. Narasimhan, and A. Sil
arXiv preprint arXiv:2211.16634 (2022).

[3] *Semantic Supervision: Enabling Generalization over Output Spaces*
A. Deshpande*, A. W. Hanjie*, and K. Narasimhan
arXiv preprint arXiv:2202.13100 (2022).

[4] *ALIGN-MLM: Word Embedding Alignment is Crucial for Multilingual Pre-training*
H. Tang, **A. Deshpande**, and K. Narasimhan
arXiv preprint arXiv:2211.08547 (2022).

[5] *Sentiment Analysis for Reinforcement Learning*
A. Deshpande and E. Fleisig
arXiv preprint arXiv:2010.02316 (2020).

[6] *Evaluating a Generative Adversarial Framework for Information Retrieval*
A. Deshpande and M. M. Khapra
arXiv preprint arXiv:2010.00722 (2020).

[7] *Improvements on hindsight learning*
A. Deshpande, S. Sarma, A. Jha, and B. Ravindran
arXiv preprint arXiv:1809.06719 (2018).

Social and Professional Service

Diversity in AI	▪ **Princeton AI4ALL, 2020:** Research instructor for Princeton AI4ALL, an initiative intended to increase diversity and inclusion in the field of artificial intelligence. Developed material, taught classes, and mentored a group of six students on a natural language processing project on detecting fake news ▪ **Deep Learning Master Class, 2019:** Conducted classes for an audience of **90** undergraduates and post-graduates from different departments, covering the basics of machine learning and deep learning [Slides]
NLP for Social Good	▪ Founder member of Princeton NLP4SocialGood, an initiative to **provide natural language processing advice** to individuals, start-ups, and non-profit organizations championing **social impact projects**
Teaching	▪ COS324: Introduction to Machine Learning (Prof. Sanjeev Arora), Fall 2020 ▪ COS484: Natural Language Processing (Prof. Danqi Chen and Prof. Karthik Narasimhan), Spring 2020
Reviewing/PC	▪ TMLR (2023), NeurIPS (2022), NAACL (2022), ICML (2022), ARR (2022), EMNLP (2021), AAAI (2020), Computer Speech & Language

Talks and Posters

- Guiding Attention for Self-Supervised Learning with Transformers [Link] — IBM Research, Yorktown, 2020
- CLEVR Parser: Geometric Learning on Language Grounded Scenes [Link] — NLP-OSS, EMNLP 2020

Extra-curricular activities

Sports	▪ Part of Inter-College IIT Madras Soccer 'B' team for two consecutive years; Dorm soccer **captain** ('17-'18) ▪ Won 3 **silvers** in cycling, 2 **silvers** in Road-Race (7.8 km), and a **bronze** in football (Inter-Hostel Sports)
Sci-tech	▪ Finished **second out of 500 teams** in Mimamsa 2017, an **All India Science Quiz** held by IISER Pune ▪ Part of the hostel team which finished **1st** in Inter Hostel Technical Meet (**TechSoc**) 2017 and **3rd** in 2016

Relevant Courses

- Reinforcement Learning
- Deep Learning
- Natural Language Processing
- Topics in Reinforcement Learning
- Principles of Machine Learning
- Theoretical Machine Learning
- Computational Models of Cognition
- Computational Neuroscience
- Philosophy of Mind