Ameet Deshpande | CS15B001

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Undergraduate Study

Program	Institution	CGPA	Branch Rank
Bachelor of Technology (2015-2019) Computer Science and Engineering	Indian Institute of Technology Madras Chennai	**9.75**/10	**2**/61

Key Projects

Neural Question-Answering Framework for Plots: FigureNet — *Prof. Mitesh M. Khapra*
Accepted at Humanizing AI Workshop, IJCAI 2018 — *Dec 2017–Aug 2018*

- Created a **novel architecture** comprising depth-wise, 1-D convolutions and LSTMs for question-answering on scientific plots
- Achieved **state-of-the-art accuracy** (83.95%) on FigureQA Dataset (Maluuba-Microsoft), bettering Relational Networks (Google DeepMind) by $\mathbf{8.53\%}$ and reducing the training time by $\mathbf{93\%}$ with $\mathbf{75\%}$ lesser computational resources
- **Co-authored** a paper which was **accepted and presented** at Humanizing AI Workshop, **IJCAI 2018**, Stockholm, Sweden

Information Retrieval using Generative Adversarial Networks — *Prof. Mitesh M. Khapra*
Under Review as a conference paper at ICLR 2019 — *Aug 2018–Present*

- **Identified issues** with the policy gradient formulation in IRGAN, an **adversarial framework** for Information Retrieval
- Theoretically corroborated the issues with baseline term and **explained the problematic loss functions** using the same
- Proposed the use of co-training and achieved **better or equal performance** in $\mathbf{60\%}$ lesser time on all three tasks in IRGAN
- **Primary author** of a technical paper which is under review as a **conference paper at ICLR 2019**, New Orleans

Leveraging Ontological Knowledge for Neural Language Models — *Prof. Sutanu Chakraborti*
Under Review at Young Researchers' Symposium, CoDS-COMAD 2019 — *Mar 2018–May 2018*

- Achieved **higher performance** (5%) and **faster convergence** (35%) in Word2Vec by using WordNet for weight-initialization
- Performed domain-transfer of vectors with the RCM model and WordNet Domain, and portrayed enhanced semantic similarity
- Proposed HRCM model and H-Ordinal Constraints for **hierarchy aware vectors** which can settle the data-knowledge trade-off

Prioritized Hindsight Experience Replay: Learning from crucial mistakes — *Prof. Balaraman Ravindran*
arXiv Article — *Jan 2018–May 2018*

- Augmented Hindsight Experience Replay (HER) with various versions of Rank-Based Prioritized Experience Replay (PER)
- Created an efficient **open source** implementation of Rank-Based PER which reduced running time by $\mathbf{90\%}$ for large buffer sizes
- Proposed the use of linearly attenuated goal sampling which yielded **faster convergence** when compared to uniform sampling
- **Authored** an arXiv article documenting both useful and failed modifications of P-HER, for easier extensions in the future

Professional Experience

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

- **Migrated** 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**, to enable **faster scale-in and scale-out**
- De-coupled the core component by creating **consistent** and **exclusive** storage structures which helped improve **parallelization**
- **Reduced CPU usage by 57%** after hosting the service and achieved close to production performance

Wipro Limited — **Bengaluru**
Summer Intern — *May 2017–July 2017*

- Used **Hierarchical Classification** (HC) to organize documents, achieving **higher accuracies** than flat classification approaches
- Proposed the use of novel **Evaluation Metrics** for HC which helped gain deeper insights into how **different models** performed
- Performed **Term Clustering** based on the corpus and **WordNet** similarities to **induce hierarchies** in a semi-supervised setting
- **Authored** an organization-wide POV-Paper highlighting the **technical and business aspects** of Hierarchical Classification

Godot Media — **Bengaluru**
Product Development Intern — *December 2016*

- Developed an algorithm—to refine and improve **content recommendation routines** for articles—which went **into production**
- Performed **topic modeling** and **introduced features** pertaining to trends and source credibility for **improved** recommendation

Selected Course Projects

Inducing Hierarchy in Options Framework by using Imitation Learning
Prof. Balaraman Ravindran *Aug 2018–Present*

- Proposed **evaluation metrics** like KL-Divergence, count-based, diffusion time and t-SNE embeddings to **evaluate options**
- **Learned options** on various gridworld and **atari** environments using a hill-climbing algorithm and evaluated them
- Proposed the use of **Hierarchical Imitation Learning** to learn options from both **hierarchy aware experts** and flat policies

GPU Assisted Scheduling
Prof. D. Janakiram *Sept 2017–Nov 2017*

- Used **K-Means** and **Genetic algorithms** to dynamically determine hardware parameters **crucial** for the OS **Load Balancer**
- The parameters determined using the **GPU** enable **optimal** resource allocation and **load balancing** in **Multi-core** machines
- **Increased throughput** by following a schedule to **minimize** the number of invocations of the GPU load balancer

Minijava Compiler
Prof. V. Krishna Nandivada *Mar 2018–May 2018*

- Realized an **optimizing compiler** for MiniJava (a subset of Java) by implementing and combining the Type Checker, IR Generator, Register Allocator and MIPS Code generator using Flex, Bison, JTB and JavaCC

Scholastic Achievements

- Awarded the **Huawei (MCM) scholarship** for securing **Branch Rank 2** among 61 students (B.Tech+Dual Degree) of CSE
- **All India Rank - 122** in **JEE (Advanced) 2015**, taken by 13 lakh students (99.99 percentile) and **first** rank in Karnataka
- Won a **Silver Medal** in the **International Chemistry Olympiad** 2015, Azerbaijan (representing India) contested by 80 countries
- **All India Rank - 18** in **KVPY 2014**, taken by **2 lakh students**; awarded **NTSE Scholarship** by N.C.E.R.T in 2013
- **All India Rank - 160** in Round 1 of **ACM-ICPC** International Collegiate Programming Contest 2016
- Received the government's **McM scholarship** for being among the **top 10** out of 850 students admitted to IIT Madras in 2015

Talks and Presentations

Deep Learning Master Class *September 2018*
Conducted classes covering basics of Machine Learning and Deep Learning, Optimization, Regularization, CNNs, Word Vectors, RNNs and Encoder-Decoder Models for an audience of 90 people comprising Undergraduate and Post-Graduate students [Slides]

A Laplacian Framework for Option Discovery in Reinforcement Learning *October 2018*
Presented usefulness of Proto-Value Functions and the paper's laplacian framework for finding useful options [Slides]

Dataless Classification *April 2018*
Presented the idea of using semantic information in label names and how this idea dovetails with co-training [Slides]

Efficiency of information search in children *October 2018*
Presented a cognitive approach to explaining how children and adults search for information equally efficiently [Slides]

Relevant Courses

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

Positions of Responsibility

Sponsorship, Saarang 2017	○ Managed content pertaining to Saarang 2017; garnered **2.25 lakh likes** on Facebook, **increasing** it by 90k ○ Part of the Sponsorship team that raised 1.6 Cr INR, **highest** by any student run college festival in India
Data Analytics, Exebit 2018	○ Single-Handedly managed the **Data Analytics event** of the Computer Science **technical festival** ○ **Designed the problem statements** for the screening round and Kaggle hosted fraud detection challenge
Mentor, Saathi, 2018	○ **Mentoring** a group of 8 freshmen to assist them in academic, co-curricular and extra-curricular activities

Extra-curricular activities

Sports	○ Part of Inter-College IIT Madras 'B' team for Football two years in a row; Hostel football **captain** (17'-18') ○ 3 **silvers** in Cycling-Race, 2 **silvers** in Road-Race and a **bronze** in football - Inter-Hostel Sports
Sci-tech	○ Part of the Hostel team which finished **1st** in Inter Hostel Technical Meet (**TechSoc**) 2017 and **3rd** in 2016 ○ Finished **Second out of 500 teams** in Mimamsa 2017, an **All India Science Quiz** held by IISER Pune