Harshavardhan.P.K.

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Education

2015-Present **5th Year, Dual Degree (B.Tech + M.tech) in Computer Science and Engineering**, *CGPA : 9.65*,
Indian Institute of Technology Madras, Chennai.

2013-15 **Class 12 - CBSE**, *AECS Magnolia Maaruthi Public School*, Bangalore, *96.2 %*.

2012-13 **Class 10 - ICSE**, *Vidya Jyothi Public School*, Kolar, Karnataka, *97.2 %*.

Research Projects

2019 **Learning policies for Social network discovery with Reinforcement learning**, *(accepted at **AAMAS 2020**).*

- Authors:Me, Priyesh Vijayan, Bryan Wilder, Dr. Balaraman Ravindran, Dr. Milind Tambe
- Proposed a reinforcement learning framework for network discovery to aid influence maximization
- The algorithm automatically learns useful node and graph representations that encode important structural properties of the network at training time.
- We tested on real-world social networks from four different domains and show that the policies learned by our RL agent provide a 7-25% improvement over the current state-of-the-art method.
- Paper link: `https://arxiv.org/abs/1907.11625`

2019 **Integrating Lexical Knowledge in Word Embeddings using Sprinkling and Retrofitting**, *(accepted at **International Conference on Natural Language Processing 2019**).*

- Authors:Aakash Srinivasan*, Me*, Devi G, Dr. Sutanu Chakraborthi
- Proposed two novel yet simple approaches for incorporating semantic knowledge via relational data from WordNet and PPDB into word embeddings based on retrofitting and SVD based methods.
- Observed significant improvements over the baselines in word similarity tasks in many of the datasets as well as extrinsic tasks: POS tagging and Named-Entity Recognition.
- Paper Link: `https://arxiv.org/abs/1912.06889`, Code Link: `https://github.com/kage08/NLP_Proj`

Internships

May 2018 - July 2018 **Software Development Intern at Mirosoft IDC, Hyderabad**.

- Worked on Agriculture stack of Microsoft India's Digital Intelligent Cloud powered platform
- Explored capabilities of R and Scala libraries for distributed Geo-spatial data processing,
- Extend data processing models to distributed setting that enabled fast and efficient scale up.
- Optimized algorithms for analysis of raster data via parallel processing in R and improved efficiency to about one-third initial running time.

May 2017 - July 2017 **Internship at Dept. of Computer Science and Automation, Indian Institute of Science, guided by Dr.Anand Louis**.

- Selected as one of the 20 interns in Narendra Intership Programme organized by Dept. of Computer Science and Automation, IISc
- Studied recent approximation algorithms for various types of k-clustering problems.
- Worked on a constant factor approximation for min max k-clustering problem in Euclidean space.

Selected Course Projects

2018 **Discovering hierarchies using Imitation Learning from hierarchy aware policies**, *(mentored by Dr. Balaraman Ravindran).*

- Authors:Me, Ameet Deshpande
- Performed qualitative and quantitative analysis of options inferred from *Deep Discovery of Options* method in Atari domains and grid-worlds.
- Experimented on different evaluation metrics like option termination condition, hinge value function error and KL-Divergence based distance metric to compare how close the learnt policies are to that of expert.
- Suggested useful heuristics that alleviates the problem of shorter options and a collapse of options to the same mode.
- Report link: `https://arxiv.org/abs/1812.00225`

2018 **Hierarchical Genetic Algorithms with evolving objective functions**, *(mentored by Dr. Sutanu Chakraborthi)*.
- Authors: Me, Kaushik Krishnan
- Proposed a framework of genetic algorithms which use multi-level hierarchies to solve an optimization problem by searching over the space of simpler objective functions.
- Used this framework to efficiently solve variant of TSP (Travelling Salesman Problem) and polynomial regression.
- Report Link: `https://arxiv.org/abs/1812.10308`, Code link: `https://github.com/kage08/CMC_proj`

2018 **Nearest neighbour queries in K Machine model**, *(mentored by Dr. John Augustine)*.
- Explored variants of the well known neighbour query data structures in $k-$*machine model* that optimizes for communication across machines.
- Designed algorithm to process large batch of nearest neighbor queries efficiently in $O(\frac{n}{\sqrt{N}})$ rounds where n is input size and N in number of machines.

2018 **Planar Algorithms in K Machine Model**, *(Mentored by Dr. John Augustine)*.
- Formulated a method for converting algorithms form the well studied PRAM model to $k-$*machine model* that preserved round complexity upto logarithmic factor.
- Used this method to solve Planar embedding, planarity testing and minimum spanning tree problem.

2018 **Decision Tree based prediction model for cache prefetchers**, *(Mentored by Dr. Janakiram)*.
- Collected cache-related data for many benchmarks from PARSEC suite from different system configurations such as number of CPU cores, memory and cache size ,etc.
- Built a decision tree based model to automatically assign different levels of caches to processes based on different performance statistics of processes related to cache hits and misses for instructions and data.

Selected Courses

Principles of Machine Learning, Deep Learning, Topics in deep Learning, Reinforcement Learning, Topics in Reinforcement learning, Natural Language Processing, Randomized Algorithms, Philosophy of mind, Cognitive models of Cognition, Computational Neuroscience, Probabilistic Graphical Models

Scholastic Achievements

- KVPY - "Kishore Vaigyanik Protsahan Yojana" Fellow with AIR-82 (conducted by Indian Institute of Science .)
- Qualified for Indian Chemistry Olympiad (2014, 2015) and Indian Physics Olympiad (2015).
- NTSE - "National Talent Search Examination" Scholar - 2012.
- Secured AIR-18 in National Science Talent Search Examination(NSTSE) - 2012.
- Qualified for Zonal round of Rural IT Quiz.

Teaching Experiance

2019 Teaching Assistant for the course: Cognitive models of Cognition

2019 Teaching Assistant for Reinforcement Learning Workshop organised for DRDO scientists at IIT Madras

2017 Teaching Assistant for Software Programming Workshop - 2017 , IIT Chennai

Technical Skills

Languages Python, R, Java, C, C++, Matlab, Julia, Scala

Tools Tensorflow, Pytorch ,LaTeX, Git(DVCS), parallelR

Extra Curricular Activities

- Participated in International Winter School on Social Entrepreneurship 2018 organized by Center for Social Innovation and Entrepreneurship, IIT Madras
- Helped create a database of available scholarships for under-privileged students as part of an awareness initiative by National Service Scheme(NSS)
- Observer at National Spastic Society, Bangalore.
- Long Distance Runner (10K in 50 min)