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Abhishek Varghese

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Education

PhD, Computer Science UMass Amherst — **Feb 2023 — Current**
MS, Computer Science with Specialization in Data Science UMass Amherst, GPA: 4.00/4.00 — **Feb 2021 — Dec 2022**
BTech, Computer Science and Engineering, Indian Institute of Technology (IIT) Goa, GPA: 8.55/10.00 — **Aug 2016 — Mar 2020**

Projects

Activity Classification using accelerometer data — **May 2025 — Present**
- Goal is to recognize the activity a given subject is performing using data from wrist worn accelerometers.
- Two Projects in work : using Transformers, signal processing and computer vision techniques.

Software Verification using Reinforcement Learning — **August 2022 — March 2024**
- Used Reinforcement Learning to generate proofs automatically for specifications in Coq.
- Our method had a better problem solving rate on the Coq-Gym benchmark than previous state of the art.
- Published in ICSE 2025.

Biologically Inspired Vision + Auto-resizing Deep Networks — **Oct 2021 — April 2022**
- Using locality and geometric constraints on loss function of a fully connected network, was able to generate similar filters as Convolutional Networks. This network structure was inspired by the biological neurons around our eyes.
- This was modified into constraints that helped a neural network shed unnecessary neurons while training. I saw a reduction of more than 60% of neurons on simple datasets while maintaining most of the accuracy.

Progressive Functional Abstraction — **March 2021 — May 2021**
- Worked to extend the concept of Progressive functional abstraction (PFA) to Reinforcement Learning agents playing games.
- PFA biologically refers to our brains using deeper layers to process harder information or to complete complex tasks.

Experience

Data Science Researcher & Programmer — **July 2025 — Current**
AHHA Lab, UMass Amherst — Massachusetts, US
- Working on applying Machine Learning methods to sensor data in Healthcare domain.

PhD Research Intern — **May 2024 — August 2024**
Epsilon, Boston — Massachusetts, US
- Created a new Product Recommendation system.
- Transformers can be used to create item embeddings in vector space. For a given product (white shirt) these embeddings can be used to recommend similar items (black shirt), and complementary items(blue pants), and range of items in between (wrist watch).
- Studied the domain of advertising, learned Databricks, Azure and distributed systems, and gained deeper insights into how Transformer models can be applied to a variety of problems outside Natural Language Processing.

Data Science Researcher & Programmer — **March 2022 — May 2025**
Laser Lab, UMass Amherst — Massachusetts, US
- Worked on Software Verification and repairing biased models with fairness guarantees using Machine Learning and statistical tools.

Skills

Programming	C++, Python, Haskell, R, HTML, CSS, JavaScript, PHP, LATEX, MySQL, QT, BASH, MATLAB, Scilab, GNU Octave
Concepts	Data Structures and Algorithms, Machine Learning Methods, Statistics, Simulation
Management	Leadership, Relation building, Community Service
Passive	Fictional writing, Critical Listening (I'm a musician, Sound Engineer for my Church)

Volunteer (or LEADERSHIP) Experience

Teaching Assistant, UMass Amherst + IIT Goa : Various courses, in total involving 500+ students
Facilitator/Instructor, Google Explore ML : Taught ≈ 100 students, via the explore ML track offered by Google.
Co-Founder - ML Circle, IIT Goa : Created a community/platform to connect researchers and students to learn and collaborate
Election Officer, IIT Goa : Built a software to help conduct student council elections(SCE). Overlooked the conduction of SCE
Food Distribution/Prep Volunteer : Volunteered in Amherst Survival center and First Baptist Church, Amherst

Awards & Honors

2020 Winner MIT Covid 19 Challenge Hackathon (**MIT**);
2019 Technical Excellence Award (**IIT Goa**); 2nd Positition Smart India Hackathon (**Govt. of India**);