SAUMYA GANDHI

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RESEARCH INTERESTS

My research interests lie mainly in Machine Learning, especially in the field of Deep Reinforcement Learning and Natural Language Processing. I also have a keen interest in Computer Vision applications of Deep Learning. Although much of my education and experience has been in Reinforcement Learning and Deep Neural Networks, I am currently diving into the field of Natural Language Processing.

EDUCATION

Visvesvaraya National Institute of Technology, Nagpur *July 2018 - Present*
Bachelor of Technology
Department of Computer Science and Engineering
CGPA: 8.93
Core CGPA: 9.63

PROJECTS

Training Chess AI using Deep Reinforcement Learning techniques *December 2019 - Present*

- Studied the basics of Reinforcement Learning concepts from *Reinforcement Learning: An Introduction* by **Richard S. Sutton** and **Andrew G. Barto**
- Further studied and understood concepts from **David Silver's** course at UCL and course CS234 offered at Stanford University
- Successfully trained the Atari Pong game with the help of OpenAI gym using **DQN** and **Experience Replay**
- Created chess AI using pure **Monte-Carlo Tree Search** algorithm and understood its drawbacks due to intensive computation of rollouts
- Created chess AI using Monte-Carlo Tree Search along with a Deep Neural Network for **value function approximation**. Training was done by generating **self-play** games on an **epsilon greedy basis**. This was closely followed from AlphaZero but adapted for training on low-power CPUs and GPUs
- Next, I have taken on **Temporal Difference** learning in order to compare the approaches and extrapolate my findings to the protein folding problem

Interactive Activation and Competition Model *May 2019 - July 2019*

- As a part of a team at **International Institute of Information Technology, Hyderabad**, we worked on developing several virtual experiments as part of a project by MHRD (namely *Virtual Labs*) which emulates a college laboratory for students whose institutes do not have the required facilities
- I was tasked with designing an experiment to emulate an Interactive Activation and Competition model as proposed by **James L. McClelland** and **David E. Rumelhart**. These models have been used for face recognition in recent times
- I studied the parallels between the biology of the brain with the Interactive Activation and Competition Networks and the mathematics behind them from the Parallel and Distributed Processing handbook

- Using the Jets-and-Sharks dataset, I created a visualization in which the excitatory and inhibitory connections can be clearly seen. The activation or deactivation of neurons in different groups due to firing of a certain neuron can be seen in real time as well as slow motion. One may pause and observe the model at any point in its process

Competitive Learning Neural Network Model *May 2019 - July 2019*

- Designed an experiment to emulate a Competitive Learning Neural Network model. These models are commonly applied to problems such as detection of **network intrusions**
- Studied the theory behind **Self-organising maps** and **winner-takes-all** mechanisms which closely resemble biological sensory systems from various research papers and the Parallel and Distributed Processing handbook
- I created a visualization where the user may select the number of data points and the SOM region(different shapes). Then the user gets a snapshot over iterations of how the features are being mapped gradually

bigInt and Heap Management Simulation *(course project)* *Jan 2020 - Feb 2020*

- Simulated rudimentary operations for **1024-bit integers** in C by implementing a new datatype **bigInt**
- Simulated a heap memory by supporting allocation and deallocation of memory using advanced techniques such as **binary buddy systems** in C

COMPETITIONS

VNIT Hackathon *February 2020*

· We Finished in top 5 teams out of 25 selected teams in campus-wide hackathon. I led a team of 6 members to present our solution for monitoring attention span in online instructor led sessions using Computer Vision techniques by extracting face keypoints

Maze Solving Autonomous Bot competition *February 2019*

· Sole fresher team to take part and come up with a line-follower-bot trained with the always-left algorithm

TECHNICAL SKILLS

Languages	C,C++,Python,Java,MATLAB
Libraries	NumPy, TensorFlow, Keras, openAI

KEY COURSES UNDERTAKEN

Mathematics

· Probability Theory and Statistical Mathematics, Linear Algebra and its Applications*, Multi-variable Calculus, Ordinary Differential Equations, Partial Differential Equations, Numerical Methods and Computation*

Computer Science

· Computer Programming **(course topper)**, Data Structures and Program Design, Discrete Maths and Graph Theory, Introduction to Machine Learning (by Andrew Ng), Introduction to Reinforcement Learning(by David Silver)

**Course to be completed by April 2020*

POSTITIONS OF RESPONSIBILITY

Co-Founder of Samvad-Debate and Discussion club, VNIT *November 2019 - present*

- Work in a team of 7 people to organize various events under the banner of this club
- We conduct discussions and debates on pressing matters that the world deals with every day
- We conduct student talks delivered by students with a unique experience which they wish to share and hence promote public speaking and sharing of knowledge
- I am Head of Reporting and responsible for creating reports for all events and their outcomes

Warden's Nominee, Hostel Council *Aug 2018 - April 2019*

- Worked in a team of 20 members to ensure the smooth stay of 600+ hostel students
- We organised various cultural nights and sports events within our hostel

Remedial Class Teacher *Aug 2019 - Present*

- I teach the subject of Computer Programming to freshers who do not feel comfortable with the course.