Chaithanya Naik

Final Year Undergraduate · Computer Science & Engineering

Room no. 8028, Hostel 18, IIT Bombay, Powai, Mumbai, Maharastra, India - 400076

(+91) 99-8710-8479 | chaithanyamcrl@gmail.com | metalcyanide | chaithanya-naik

Education

Indian Institute of Technology Bombay *Mumbai, India*

Dual Degree (BTech + MTech) in Computer Science and Engineering | CGPA: 7.41 *July 2016 - Present*

- Pursuing research in Reinforcement Learning, Deep learning & Quantum Computing
- Pursuing Honors in Computer Science and Engineering
- Minor in Physics and Minor in Data Science & Machine Learning

Industry Experience

Amazon Development Centre India Pvt. Ltd *Hyderabad, India*

Auto Trouble Ticket Manager | Software Development Engineer *May - July 2019*

- Automated process of resolving trouble tickets raised on amazon services by developing java package
- Developed a generic framework to plug-in their models for information retrieval and auto-suggesting resolution
- Designed run-time compilation module using Java Compiler API to implement dynamic code execution by converting java snippet code from different source packages into a compiled java object

OYO - Oravel Stays Pvt. Ltd *Gurugram, India*

Price Elasticity estimation | Data Science Intern *May - July 2018*

- Designed a prediction model in R that predicts the likelihood of achieving certain profit from the current situation and gives the optimized path of price movement using probability-based analysis
- Implemented density-based clustering using HDBSCAN density cluster model to remove the outliers
- Implemented two-stage least squares instrumental variable model to remove biases in explanatory variables

Darwin Travel Tech *Mumbai, India*

Tour Package | Software Development Engineer *December 2017*

- Developed text classification model using python based Natural Language Toolkit to extract information
- Developed Java Spring Platform to automate generation of itinerary for a tour package with minimum cost possible
- Reduced the time taken by API calls using multi-threading to get transport, hotels and activity details

Research Experience

Modular Quantum Computer Design *Mumbai, India*

Master's Thesis Project | Quantum Information & Technologies Lab | Prof. Sai Vinjanampathy *Ongoing*

- Designing protocols, basic set of instructions for general n-Qubit Gates to enable fault-tolerant quantum computation
- Implementing a modular RL framework for determining the optimal pulse sequence for any general quantum gate preparation
- Implemented Deep RL techniques like DQN, DDPG, Trust Region Policy Optimization, and Proximal Policy Optimization

Interactive Image Segmentation *Mumbai, India*

Undergraduate Research | Medical Deep Learning & AI Lab (MEDAL) | Prof. Amit Sethi *Ongoing*

- Implementing interactive image segmentation using SeedNet by automatically guessing the object that should be segmented using DQN
- Applying data augmentation strategies on medical images using Generative Adversarial Networks(GANs)
- Implementing interactive image segmentation in multi-tissue histopathology using HoVer-net on a synthetic dataset

Quantum Gate Optimization *Mumbai, India*

Undergraduate Research | Quantum Information & Technologies Lab | Prof. Sai Vinjanampathy *July 2019- December 2019*

- Implemented Subspace Selective Self-Adaptive Differential Evolution (SUSSADE) technique to generate the instructions for determining the control parameters of the quantum control scheme
- Critically analyzed advantages of GrAPE with Push-Pull optimization and RL approaches like Q-learning, Deep-Deterministic Policy gradient methods and evolutionary RL for improving existing bounds for gate fidelity

Tangram Solver (Dissection Puzzles) *Mumbai, India*

Undergraduate Research | Prof. Shivaram Kalyanakrishnan *Jan 2020 - June 2020*

- Developed a UI to extract a puzzle from images using Harris Corner Detection and Canny Edge Detection algorithm
- Designed an end-to-end application to solve Tangrams, NP-hard problem using simulated annealing with angle heuristic
- Critically analyzed largest piece first placement order to decrease branching factor of the search problem

Academic Projects

Gomoku RL Playing Agent
Fundamentals of Intelligent agents

PROF. SHIVARAM KALYANAKRISHNAN
Autumn 2020

- Created Gomuku playing AI agents usingMonte Carlo Tree Search (MCTS) algorithm in C++ and analyzed various aspects of the algorithm
- Implemented efficient guided search using various heuristics to create different learning AI agents using reward shaping, setting up intelligent priors and utilized multi-threading to carryout rollouts in parallel

Depth Map Prediction From Single Image
Computer Vision

PROF. ARJUN JAIN
Spring 2019

- Built two-stack CNN-Residual Network model to estimate depth map from a single RGB image
- Implemented transfer learning using pretrained ResNet-50 network by replacing last fully connected layer with upsampling convolutional layer to enhance the performance
- Trained and tested the model on NYU Depth dataset of indoor scenes and ApolloScape dataset of outdoor scenes

Compiler for C-like language
Compilers

PROF. UDAY KHEDKAR
Spring 2019

- Developed a compiler and evaluator for a subset of C supporting functions, scope levels, and control sequences
- Utilized Lex for tokenizing, Yacc for parsing and constructed AST to generate MIPS assembly code

Features of XV6
Operating Systems

PROF. PURUSHOTTAM KULKARNI
Autumn 2018

- Examined xv6 source code and implemented process scheduling algorithms like round robin and priority-based
- Implemented Memory management techniques like lazy page allocation and applications of pthreads

Fake News Detection by Crowdsourcing
Database and Information Systems

PROF. SUDHARSHAN
Autumn 2018

- Developed web and android App for crowd-sourcing the verification of spurious news articles
- Designed a database schema for users, volunteers and admins providing tools to review, appoint and approve
- Implemented routing algorithms to distribute tasks among volunteers based on domain-specific knowledge

Microarchitectural Attacks
Computer Architecture

PROF. BERNARD MENZES
Autumn 2018

- Implemented FLUSH+RELOAD attack to extract the private key from the GnuPG implementation of RSA
- Implemented Cache Template Attack to profile and exploit cache-based information leakage of programs
- Proposed automated DRAMA Template attack by reverse engineering DRAM addressing and template attack

3D Modeling and Animation
Computer Graphics

PROF. PARAG CHAUDARI
Autumn 2018

- Designed 3D graphical models through hierarchical modeling in C++ OpenGL with textures, shading, and lighting
- Implemented framework to create dynamic Bezier curves through clicked control points for camera motion

Socializing - Social Networking Platform
Software Systems Lab

PROF. KAVI ARYA
Autumn 2017

- Developed Django based web application which serves as a social platform to interact through posts and messages
- Implemented real-time chat-box using Django channels with the help of web-sockets

TeleCommunication System Design
Computer Networks

PROF. BHASKAR RAMAN
Spring 2018

- Designed a prototype of communication system implementing a set of basic functionalities of the physical layer and link layer of internet protocol stack, from scratch using Arduinos

Railway Signal Controller
Digital Logic Design

PROF. SUPRATIK CHAKRABORTY
Spring 2018

- Developed a PC (backend) in C to synchronize between multiple FPGAs (Railway Signal Controllers) via. UART securely using encryption and programmed the FPGA in VHDL to show signals accordingly

Academic Achievements

OLYMPIADS & COMPETITIONS

2019	**Gold Medal**, Bosch's Route Optimization challenge at the 8th Inter IIT Tech Meet
2019	**2nd position**, Capture The Flag cybersecurity challenge at the 8th Inter IIT Tech Meet
2017	**Gold Medal**, Star Cluster Identifier competition at the 7th Inter IIT Tech Meet
2015	**Amongst Top 300 students**, in the country qualified for Indian National Physics Olympiad (INPhO)
2013	**State Rank 4**, 41st APAMT
2011	**All India Rank 12**, 43rd National Mathematics Olympiad by AMTI

Scholastic

2016	**All India Rank 340,** in IIT JEE Advanced amongst 150,000 candidates
2016	**All India Rank 176,** in IIT JEE Mains out of 1.2 million candidates
2016	**State Rank 57,** in TS-EAMCET conducted by Ministry of HRD, Govt of Telangana
2016	**State Rank 109,** in AP-EAMCET conducted by Ministry of HRD, Govt of Andhra Pradesh
2014	**All India Rank 173,** Recipient of Kishore Vaigyanik Protsahan Yojana (KVPY) Scholarship
2012	**National Top 300,** Recipient of NTSE Scholarship awarded by NCERT under Ministry of HRD

Technical Skills

Programming Languages	C/C++, Python, Java, R, Racket(Scheme), SWI-Prolog, Bash, VHDL
Software Skills	Git, LATEX, MATLAB, OpenCV, GNU Make, Android Studio, Django
Deep Learning	PyTorch, TensorFlow, Keras, TensorFlow Quantum

Relevant Courses

Computer Science	Data Structures & Algorithms, Networks, Compilers, Operating Systems, Database, Architecture, Automata Theory
AI & ML	Reinforcement Learning, Web Mining, Advanced Machine Learning, Computer Vision
Miscellaneous	Blockchain Technology, Virtualization, Quantum Computing & Information,

Positions of Responsibility

Department General Secretary
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

IIT Bombay
April 2019 - July 2020

- Elected student representative in department policy formulation committees to ensure student involvement
- Re-instantiated and managed Cyber-Security Club, organized CTF events to increase awareness about cybersecurity
- Spearheaded a 3-tier team of 21 members in organizing sports & social activities, helping students in dealing with academics related issues

Chief Editor | Department Newsletter
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

IIT Bombay
April 2019 - July 2020

- Spearheaded a 3-tier team of 12 members in designing and development of the content for articles pertaining to research groups, the scope of career in core and non-core sectors and semester exchange experience

Department Academic Mentor
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

IIT Bombay
June 2020 - Present

- Mentoring 4 sophomores for their academic and general concerns, and helping them cope with the curriculum
- Mentor to additional 2 students in an academic rehabilitation program (ARP) & guiding them back on track

Teaching Assistant
PROGRAMMING LAB

IIT Bombay
Autumn 2020

- Responsible for clarifying queries of students in discussion forums and labs, helping with creation of course material and grading assignments

Technical Mentoring
COMPUTER VISION, REINFORCEMENT LEARNING, QUANTUM COMPUTING & WEB DEVELOPMENT

IIT Bombay
Summers 2020

- Mentored a group of 4 students for the project, Spoof-Resistant Facial Recognition using Deep Learning
- Mentored a group of 6 students for designing Rubik's Cube Solver using Reinforcement Learning
- Mentored a group of 6 students for creating star hopping guide & creating astronomy website using Django
- Helped a total of 12 students in pursuing their interests in Quantum Computing and Information, Astronomy & Computer Vision

Convener
KRITTIKA - THE ASTRONOMY CLUB

IIT Bombay
April 2017 - March 2018

- Organized numerous events like series of lectures, trips to GMRT and Nehru planetarium, star gazing sessions
- Efficiently managed a budget of 200 thousand INR and improved the outreach of club in the institute

Extracurricular Activities

- Part of the Inter IIT contingent securing **Runner's Up Position** at Inter IIT Tech Meet held at IIT Bombay — 2018
- Awarded **Hostel Player of GC (Carrom)** for best performance in Inter Hostel Sports, IIT Bombay — 2016
- Completed a year long course in **Athletics** offered by National Sports Organization **(NSO)**, IIT Bombay — 2016
- Attended **Vijyoshi Science Camp** organized by Indian Institute of Science **(IISc)**, Bengaluru, India — 2015