Anirudh Ajith

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Education

Indian Institute of Technology Madras **2018 – 2022**
B. Tech, Computer Science and Engineering; CGPA: 9.42 *Chennai, India*

AECS Maaruthi Magnolia PU College **2016 – 2018**
Department Of Pre-University Education, Karnataka; 96% *Bangalore, India*

National Public School, Rajajinagar **2004 – 2016**
Central Board of Secondary Education; CGPA: 10 *Bangalore, India*

Research Projects

Tuning sentence-embeddings for high-recall IVFPQ search *Dr. Mitesh Khapra, Dr. Pratyush Kumar* | **Aug 2021–present**

- Developed a method to improve bitext-mining recall when using approximate nearest-neighbour search on the IVFPQ indexing structure.
- Adapted an existing differentiable product quantisation formulation to create a differentiable formulation of IVFPQ quantisation that can output quantised representations and codes required for IVFPQ search and can also be trained e2e in a neural network.
- Devised a training paradigm that allows the model to optimise sentence embeddings it generates to make them more suitable for high-recall bitext mining (when using IVFPQ indexing).

Sample-specific attention-head masks in BERT models *Dr. Pratyush Kumar, Dr. Mitesh Khapra* | **Feb – Apr 2021**

- Performed experiments testing possible applications of trained sample-specific attention-head masks in BERT models.
- Developed a technique to detect adversarial inputs during test-time using their sample-specific masks using mask-inversion, layer-wise predictions, etc.
- Achieved accuracies of between 0.8055 and 0.9027 accuracy on adversarial input detection on four GLUE datasets.

Internships

Microsoft India (R&D) Pvt Ltd | *C#, Python, Microsoft COSMOS, other internal tools* **May – Jul 2021**

- Created a troubleshooting-snippet disambiguation pipeline for Microsoft's *Bing* search-engine.
- The pipeline takes a set of solution snippets (scraped from various websites using existing *Bing* infrastructure) to a tech-related troubleshooting search query and filters it down to a set of semantically unique solutions for direct display on the *Bing* SERP.

Flutura Decision Sciences & Analytics | *Python, TensorFlow, Keras* **May – Jul 2020**

- Developed computer vision models based on *YOLOv4* and *Retinanet*.
- Created computer-vision products for multiple clients from scratch on problems including 1) autonomous defect detection in die-casted components, 2) autonomous cell-phone usage detection and 3) autonomous defect detection in printed circuit boards.

Professor Rupesh Nasre, IIT Madras | *Kotlin, Android Studio* **May – Jul 2020**

- Researched, scripted and created multiple instructional videos on selected topics in parallel processing.
- Created an Android app from which the videos could be viewed.

Selected Course Projects

automated B/W portrait colorization (ongoing) | *PyTorch* *Professor Sukhendu Das* | **Sep – Nov 2021**

- Creating a pipeline for converting B/W or sepia portrait photographs to color photographs using few training samples.

image2image translation | *PyTorch* *Professor Anurag Mittal* | **Dec – Jan 2021**

- implemented, tested and benchmarked a unified framework proposed by a CVPR paper on Image to Image Translation for Domain Adaptation

σ-promoter classification | *PyTorch* *Professor Manikandan Narayanan* | **Nov – Dec 2020**

- augmented a SOTA model for σ-promoter classification in *E. coli* by introducing attention layers and residual connections to increase accuracy by 1.6%.

device driver | *C, RISC-V* *Professor Chester Rebeiro* | **Nov – Dec 2020**

- Wrote a UART device driver for *ZephyrRTOS* for the RISC-V *Shakti E-class Parashu* SOC.
- Performed testing on a physical SOC unit.

C compiler | *C, x86 assembly, Lex, Yacc* *Professor Rupesh Nasre* | **Jul – Nov 2020**

- Wrote an compiler for a slightly stripped-down version of C using the tools Lex and Yacc.
- Wrote an LR(1) context free grammar for C and encoded it into Yacc, designed logic to carry out code generation and implemented 6 parse-tree level optimizations.

16-bit computer | *C++* *Professor V. Kamakoti* | **Jul – Nov 2019**

- Created a functional computer with a simple 16 bit architecture (in a simulator) bottom-up using only NAND gates.
- Wrote an assembler, and a basic compiler for an LL(2) high-level language in C++.

Personal Projects

automated attendance system | *TensorFlow, Keras* **May – Jul 2020**

- Created an autonomous attendance system pipeline for classrooms using the popular neural networks *MTCNN* and *FaceNet*.
- Wrote a KNN-like algorithm to match faces from a PTZ camera feed to personal identities using a database containing ∼4 photographs each of students' faces.

process wallpaper | *Python, Bash* **Aug - Sep 2019**

- Wrote a set of Python and bash scripts which periodically set the desktop wallpaper to a wordcloud of the most resource-intensive processes running.
- This project became semipopular on GitHub and was mentioned on an episode of a podcast called *Linux Unplugged*.

miniprojects | *Python, React, Angular, nodeJS, Bash* **Oct – Jan 2020**

- **web development** Worked on front-, and back-end development for the official website of *Saarang 2020*, the annual IIT Madras cultural fest.
- **classic games** Created clones of *Snake* and *2048*.
- **gp** Created and implemented a personal multi-platform pseudorandom strong password generation scheme
- **breaking-badify** Wrote a script which creates images of input text using symbols from the periodic table.

Scholastic Achievements

2020 **IAS Fellowship** Recipient of Indian Academy of Sciences Summer Research Fellowship

2020 **Flipkart GRiD 2.0** Declared National level Semi-Finalist

2016 **KVPY** Secured All India Rank 108 in Kishore Vaigyanik Protsahan Yojana (SA)

2016 **NTSE** Secured National Talent Search scholarship

2015-18 **Indian National Olympiads** National Finalist in Computing/Informatics every year from 2015 to 2018, in Astronomy in 2017 & 2018 (State rank 1, National top 1%), Physics in 2018 (State rank 4, National top 1%) and Merit Certificate for State top 1% in Chemistry

2017 **National Mathematics Talent Contest** Secured All India Rank 9 in Ramanujan contest

2016-17 **Regional Mathematics Olympiad** Selected for Indian National Mathematics Olympiad Training Camp

Relevant Coursework

computer science: Introduction to Programming (+ Lab); Discrete Mathematics for Computer Science; Programming and Data Structures (+ Lab); Foundations of Computer Systems Design (+ Lab); Languages, Machines and Computation; Design and Analysis of Algorithms; Computer Organisation and Architecture (+ Lab); Object-Oriented Algorithms Implementation and Analysis Lab; Pattern Recognition and Machine Learning; Compiler Design (+ Lab); Operating Systems (+ Lab); Paradigms of Programming; Algorithmic Approaches to Computational Biology; Foundations of Deep Learning; Reinforcement Learning; Statistical Foundations of Data Science; Computer Vision; Natural Language Processing

mathematics: Multivariable Calculus; Series and Matrices; Basic Graph Theory; Probability, Stochastic Processes and Statistics; Differential Equations; Linear Algebra

online: Machine Learning; Neural Networks and Deep Learning; Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization; Structuring Machine Learning Projects; Convolutional Neural Networks; Sequence Models

Technical Skills

languages: C, C++, Python, Julia, JavaScript, Bash
software: Linux, Git, Docker, GNU Octave, LaTeX, GIMP, Google Sketchup
development: HTML, CSS, JavaScript, nodeJS, ReactJS, Angular
operating systems: Linux, Windows

Positions of Responsibility

Computer Vision and Intelligence Group **2019**
Project Member *Indian Institute of Technology Madras*

Developmental Operations Team, Saarang 2020 **2019**
Coordinator *Indian Institute of Technology Madras*

Computer Science Association **2013 – 2014**
President *National Public School, Rajajinagar*