

Areas of Interests

Machine Learning, Information Security and Computer Vision

Education

Indian Institute of Technology Roorkee

July 2014 - May 2018

Bachelor of Technology, Computer Science & Engineering

CGPA: 9.47 / 10, Department Rank: 3 / 76

Publications

Palai, A.*, **Vora, M.***, Shah, A.* (2017). *Empowering Light Nodes in Blockchains using Block Summarization*.

Submitted to International Workshop on Blockchains and Smart Contracts (BSC), IFIP International Conference on New Technologies, Mobility and Security (NTMS) 2018

Internships

Describing Videos for Marketers | BigData Experience Lab, Adobe Research, Bengaluru

Summer 2017

The project involved a comprehensive analysis of commercial brand videos, using recent deep learning techniques to understand the content being produced. Several features of videos like action, affect and semantics were extracted. This was followed by developing machine learning methods to learn to generate new videos automatically, based on a training corpus of brand videos.

Achievements

- Secured All India Rank 51 in *ACM ICPC 2018* online round among 3250 teams.
- Secured All India Rank 5 in the national-level final onsite round of *Microsoft Build The Shield CTF 2016* [CTF: Information Security Contest] & All India Rank 7 in qualifiers.
- Selected to represent IIT Roorkee at *Inter-IIT Tech Meet 2018*.
- Secured All India Rank 1588 among ≈ 0.15 million students, in *JEE Advanced 2014*.

Key Projects

Extracting Discriminative Features for Images

Sept 2017 - Present

Under the guidance of Dr. B Banerjee, Assistant Professor, CSE, IIT Roorkee

[link]

The project focuses on extracting dense and discriminative features by applying group sparsity and mutual information constraints in the fully connected layers of CNN models. The project also focuses on adaptive pooling for better feature extraction.

Block Summarization: Empowering Light Nodes in Blockchains

Jan - May 2017

Under the guidance of Dr. S Gangopadhyay, Associate Professor, CSE, IIT Roorkee

[link]

The project proposes a novel approach to enable transaction validation on light nodes in blockchain ecosystem by summarizing blocks. Following the Bitcoin case study, we developed & implemented various protocols & algorithms pertaining to transactions, consensus & summarization in blockchains.

Design study and cryptanalysis of S-Boxes & Q-groups

May - June 2016

Under the guidance of Dr. S Gangopadhyay, Associate Professor, CSE, IIT Roorkee

[link]

The project involved study & analysis of cryptographic properties, like nonlinearity, ANF & resiliency, of substitution boxes of various ciphers including DES & PRESENT. The project also dealt with Quasi-groups & cryptanalysis of 4-round quasi-s-boxes. Also developed a toolkit to test the properties & structure of boolean functions & s-boxes.

Media Management Service

Aug '15 - Jan '16

Developed a back-end service for *Django* to manage & handle media files and requests. Besides media file compression and storage, the service tracks user actions on files & provides options for file recovery & transformation. Also implemented rule based authentication to verify file parameters & create a suitable output file.

Projects

Predicting Network Traffic for Energy Optimization: Forecasting future values of network traffic on Institute intranet server using ARIMA, Generalized Autoregressive Score & LSTMs to model the time-series problem.

Segregating Positive News Articles: Application that looks for hyperlinks on a given webpage & highlights the ones that cover positive news. Used GRUs and Word Embeddings.

MLP Toolkit: A simple python-only toolkit to create an MLP classifier with custom layers, activations, regularization and initialization policies. Currently, the project has 180 GitHub stars.

Matasano Crypto: Solved Matasano (modern) Cryptography challenges on block & stream ciphers and RSA.

Handwritten Bootloader: A basic implementation of bootloader & kernel for x86 architecture using NASM assembler.

Distributed Domain Namespace Server: Service for iterative address resolution using RPC for intra-node communication.

Technical Skills

Programming Languages: Python, C, C++, MATLAB, Shell Scripting, Assembly, SQL, R, JavaScript, PHP, Haskell

Tools & Libraries: TensorFlow, PyTorch, Caffe, Keras, Scikit-learn, SageMath, RStudio, Pandas, Django

Positions of Responsibility

Chief Technical Lead, Information Management Group, IIT Roorkee 2014 - Present

Information Management Group develops and maintains the IIT Roorkee Internet & Intranet systems and portals including the Institute website, Content Management System, Placement and Academic Portal.

- Maintaining the technical stack and servers of institute's intranet and internet systems.
- Responsible of initiating fundamental changes in development cycle of applications to optimize the resource usage of servers and reduce number of communications between servers and databases.
- Delivered regular lectures for juniors on machine learning & deep learning models, network security, blockchain, advanced python programming among many more.

Senior Executive Member, Data Science Group, IIT Roorkee 2016 - Present

Conducted workshops on problem solving approaches and research paper discussions with an aim of increasing technical culture in campus. Currently, we are involved in implementation projects to further our understanding of data science and machine learning.

Cell Secretary, National Service Scheme, IIT Roorkee 2016 - 2017

Involved in various social activities, including the adoption of flood-struck villages, organizing and conducting blood donation camps, social awareness camps & regular teaching sessions for the underprivileged. Besides organizing these activities, I was responsible for the online presence and online portal.

Mentor, Student Mentorship Program, IIT Roorkee 2017 - Present

Conducted bi-weekly sessions for freshers to help them cope with academics and extra-curriculars. Also mentored a group of specific students to help understand specific topics like competitive coding and software development.