

Areas of Interests

Machine Learning, Information Security and Computer Vision

Education

Indian Institute of Technology Roorkee

Bachelor of Technology, Computer Science

CGPA: 9.50 / 10, Department Rank: 3 / 76

July 2014 - May 2018

Publications

Palai, A.*, **Vora, M.***, Shah, A.* (2017). Empowering Light Nodes in Blockchains using Block Summarization. [\[PDF\]](#)
International Workshop on Blockchains and Smart Contracts, IFIP International Conference on New Technologies, Mobility and Security 2018, Paris.

Internships

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

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 54 in ACM ICPC 2018 online round among 3250 teams.
- Secured All India Rank 5 in the national-level finals of Microsoft Build The Shield CTF 2016 & AIR 7 in qualifiers.
- Secured All India Rank 1588 among ≈ 0.15 million students in JEE Advanced 2014.
- Secured All India Rank 875 among 1.4 million students in JEE Mains 2014.
- Secured Rank 4 in Fiducial Localization Challenge, Inter-IIT Tech Meet 2018.

Research Projects

Learning Discriminative Features for Images

Ongoing

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

The project focuses on extracting dense discriminative features by using sparsity constraints in the fully connected layers. Also working on adaptive pooling for better feature extraction.

Anomaly Detection using Telemetry Data

Ongoing

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

Working on fault diagnosis, anomaly detection and pattern generation using Logical Analysis of Data on satellite telemetry data. The project is in collaboration with National Academy of Sciences of Belarus.

Block Summarization: Empowering Light Nodes in Blockchains

Jan - May 2017

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

[\[code\]](#)

Proposed a scheme to enable transaction validation on light nodes and reduce storage space. Developed & implemented summarization protocols to obtain 45% compression on Bitcoin blocks.

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

May - June 2016

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

[\[code\]](#)

Analyzed cryptographic properties—nonlinearity, ANF & resiliency, of substitution boxes of DES & PRESENT. Extended the work to Quasigroups & cryptanalysis of 4-round quasigroup s-boxes.

Projects

PySyft, Homomorphically Encrypted Deep Learning Library: As a member of [OpenMined](#), developed homomorphic encryption and weight update scheme for classifiers. Currently, the project has 650 GitHub stars. (Ongoing) [\[code\]](#)

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. [\[report\]](#)

Media Management Service: A backend Django service to manage media files & requests. Features include file compression, user tracking, file recovery system and custom authentication system.

MLP Toolkit: A python toolkit to create multilayer perceptron classifiers with custom layers, activations, regularization & initialization policies. Currently, the project has 170 GitHub stars. [\[code\]](#)

Fiducial Localization: Unsupervised detection of fiducial markers in volume of sequential CT/MRI DICOM images using Markov Random Field and Voxel-based morphometry.

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

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

Teaching Experience

Teaching Assistant: CSN-382 Machine Learning, IIT Roorkee

Spring 2018

Positions of Responsibility

Chief Technology 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 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.

Cell Secretary, National Service Scheme, IIT Roorkee

2016 - 2017

Involved in social activities – adoption of flood-struck villages, organizing and conducting blood donation camps, social awareness camps & regular teaching sessions for the underprivileged. Also responsible for web 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.