Honey **Dinesh Nikam**

Senior Undergraduate, IIT Kanpur

honeyn@iitk.ac.in +91 8329938061 https://vrukshanikam.github.io

Education

2022 | **Indian Institute of Technology, Kanpur**
Bachelor of Technology, Mechanical Engineering, **CGPA : 9.11/10**

2018 | **Arihant School of Arts, Commerce and Science, Pune**
Maharashtra State Board of Secondary and Higher Secondary Education, 92.3%

Publications

Sep 2020 – May 2021 | **Long Short-Term Memory Implementation Exploiting Passive RRAM Crossbar Array** [arXiv]
Honey Nikam, Siddharth Satyam, Shubham Sahay
IEEE Transactions on Electron Devices

- Encoded LSTM network parameters shared across the different time steps as the conductance-states of a passive RRAM crossbar array to perform in-situ computations.
- Introduced a hybrid of stochastic gradient descent and Manhattan rule for training.
- Performed an extensive analysis of the proposed LSTM network implementation considering the non-ideal hardware artefacts such as device-to-device variations, non-linearity, noise, etc.
- Proposed implementation outperforms the prior digital and active 1T1R RRAM array-based LSTM implementations by several orders of magnitude in terms of area and energy consumption.

RNN | LSTM | Neuromorphic computing

Sep 2020 – Jul 2021 | **Energy-Efficient Implementation of Generative Adversarial Networks on Passive RRAM Crossbar Arrays** [arXiv]
Siddharth Satyam, Honey Nikam, Shubham Sahay
Under Review

- Implemented a hardware-aware simulation of Generative Adversarial Networks to synthesize realistic looking images of the MNIST dataset
- Introduced a weight-to-conductance mapping rule which allows for positive and negative weight matrices.
- Analysed the effects of true random noise as the input on the accuracy and energy efficiency of GANs.
- Compared the accuracy of the proposed implementation with active 1T-1R and software counterparts.

GAN | RRAM | Memristor Crossbar Arrays

Research Projects

Aug 2021 – Ongoing | **Spectrum Based Fault Localization Using Graph Neural Networks** [report]
Prof. Subhajit Roy, Department of Computer Science, IIT Kanpur

- Implemented the spectrum based fault localization problem as a graph neural network with test cases and components represented as graph nodes.
- Generated node embedding vectors by aggregation of messages from test nodes to component nodes.
- Computed component bug suspicion probabilities using embedding vectors through feed forward networks.
- Compared results with respect to state of the art metrics for fault localization such as Ochiai and Tarantula.

Spectrum Based Fault Localization | Graph Neural Networks | Deep Graph Library

Work Experience

May 2021 – Aug 2021 | **Software Engineering Intern, Uber, Hyderabad**

- Implemented different time series models to predict Uber Eats data for the next 7 days such as city-wise gross bookings, web sessions etc.
- Built a Long-Short Term Memory Network and Bayesian Neural Network implementation that provides time series prediction along with uncertainty estimation.
- Implemented and analysed classical time-series models such Autoregressive Integrated Moving Average, Exponential Smoothings and packages such as Prophet (Facebook Open Source), orbit (Uber Open Source) to find the best fit model for predictive forecasting.
- Collaborated with the team that developed Orbit, Uber's open-source package for time series forecasting.

time-series forecasting | Bayesian LSTM | ARIMA

Jul 2019 – May 2019 | **Summer Intern, Talentpod Techserve, Bangalore** [code]

- Built a Django web application with a user's social media reliant MongoDB database and a TensorFlow powered low level cognitive filtering news recommendation system.
- Used news APIs for searching and retrieving live articles where the queries and keywords were extracted from user's emails such as keywords in the sender/receiver, subject, tf-idf ranked keywords in the mail body
- Experimented with libraries such as NLTK, TensorFlow, Keras, scikit-learn for better classification, keyword extraction, and document analysis to improve the relevancy between the news articles and the user's mails.

Recommender Systems | NLP | TensorFlow | Django | MongoDB

</> Projects

Mar 2020 – Feb 2020 | **Differential Text Highlighter, Association of Computing Activities, IIT Kanpur**

- Mentored a group of six students on the basics of Natural Language Processing
- Built a text highlighter that highlights text in different shades on the basis of importance of sentences using extractive text summarization.

NLP | NLTK

Apr 2021 – Feb 2021 | **Computational Fluid Modelling, Prof. K. Muralidhar, IIT Kanpur** [code]

- Performed higher order explicit schemes to solve systems of differential equations.
- Studied discretization errors, compared the time complexity and stability of different order schemes.
- Numerically simulated velocity distribution of turbulent flow using Navier Stokes equations.

Fortran | MATLAB

Mar 2019 – Jan 2019 | **Fundamentals of Theoretical Computer Science, Association of Computing Activities, IIT Kanpur**

- Studied preliminaries of Theory of Computation, Discrete Mathematics and Number Theory.
- Dived deeper into the concepts of Turing Machines, Undecidability, Context-free grammars and languages, Finite Automata, Regular Expressions etc.
- Worked on proving the equivalency of Multi-Tape Turing Machine and Single-Tape Turing Machine.

Finite Automata | CFL | NP

Relevant Coursework

Programming	Data Structures and Algorithms, Fundamentals of Computing
Mathematics	Linear Algebra, Mulitvariable Calculus, Complex Ananlysis, ODE, PDE
Electronics	Introduction to Electrical Engineering, Power Electronics, Control Systems
Psychology	Social Psychology, Human Perceptual Processes, Cognitive Neuroscience

Technical Skills

Languages	Python, C++, C, HTML, CSS, JavaScript
Frameworks	NodeJs, Django, TensorFlow, Matplotlib, Keras
Utilities	MySQL,Git, MongoDB, Heroku,Linux Shell Utilities, LaTeX, MATLAB

Achievements

Received a **Pre-Placement Offer from Uber India R&D team**
Academic Excellence Award for exceptional academic performance in sophomore year

Examinations	**Goethe-Zertifikat A2 Fit in Deutsch 2** (German Examination Level A2) **Regional Mathematics Olympiad** (State-Level), Merit Certificate **Maharashtra Talent Search Examination** (State-Level), Merit Certificate
Competitions	**Pitch Prime 2019 Winner**, Idea pitching event for the students of IIT Kanpur
Dance	**Bharatnatyam Prarambhik**, Tilak Maharashtra Vidyapeeth, Pune

Extracurriculars

Leadership Positions	**Senior Executive, Entrepreneurship Cell, IIT Kanpur** **Secretary, Book Club, IIT Kanpur** **Student Guide and Academic Mentor, Counselling Service, IIT Kanpur**
Talks	Department of Cognitive Science, IIT Kanpur **The Circular Problem of Attention and Perception** **How Intelligent is Perception?** **Are Sensation and Perception Separate Stages?**