Radhit **Dedania**

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EDUCATION

2020	**B.TECH**(DOUBLE MAJOR) (COMPUTER SCIENCE - ELECTRICAL ENGINEERING)	IIT KANPUR	**8.7/10.0**
2014	**AISSCE** (CENTRAL BOARD OF SECONDARY EDUCATION)	DAV PUBLIC SCHOOL, KOTA	**93.20 %**
2012	**ICSE** (COUNCIL FOR THE INDIAN SCHOOL CERTIFICATE EXAMINATION)	SN KANSAGRA SCHOOL, RAJKOT	**92.57%**

SCHOLASTIC ACHIEVEMENTS

- Felicitated with **Academic Excellence Award**(awarded to Top 10%) at **IIT Kanpur** for academic years **2015-2016** and **2016-2017**
- Received a **Pre-Placement Offer** from **Adobe** based on work done during **internship** at **Big Data Experience Lab, Bangalore**
- Honored to be **one of ten students** selected for a **second major** in **Computer Science** at **IIT Kanpur** based on **GPA**
- Received **Student Undergraduate Research Graduate Excellence(SURGE) fellowship** for **research project** in summer of **2017**
- Offered **OPJEMS Scholarship** at the end of year **2017** for being ranked **second** among 130 students of **Electrical Engineering**
- Received **Merit-cum-Means Scholarship**(awarded to financially-weak, academically meritorius students) for past four years
- Obtained **A*** grade(for best performance in a course) in courses titled **Introduction to Philosophy** and **Chemistry Laboratory**
- Placed on **Honor Roll** of **SN Kansagra School** as a consequence of academic performance in **ICSE** exam held in the year **2012**
- Secured **All India Rank - 990** in **JEE (Advanced) 2015** among 150 thousand candidates that had cleared JEE Mains
- Achieved **99.9 percentile** in **JEE (Mains) 2015** among 1.5 million candidates that appeared for it across India
- Procured **All India Rank - 1239** in **National Level Science Talent Search Examination** in the year **2009**, organized by **Unified Council**
- Attained **All India Rank - 1214** in **Unified Cyber Olympiad** in the year **2010**, conducted by **Unified Council**
- Awarded **Certificate of High Distinction** in **Australian Chemistry Quiz-2010**
- Presented with **Certificate of Distinction** in **International Maths Olympiad-2010**, conducted by **Science Olympiad Foundation**
- Conferred with **Certificate of Distinguished Performance** in **ASSET Exam-2010**, conducted by **Educational Initiatives**

RESEARCH/WORK EXPERIENCE

TRADING INFRASTRUCTURE DEVELOPMENT & QUANTITATIVE RESEARCH
January 2020- June 2020

Software Development Intern, NK Securities — *Mentors: Founders(NK Securities)*

- Accomplished a meticulous study of the existing code base of the trading setup for NSE(National Stock Exchange) with focus primarily on tick-by-tick(tbt) data transmission from exchange to strategy engine
- Worked on creation of a statistics computation engine for live trading analysis and back-tested it by running simulations on past tbt data
- Successfully cleared the NISM-VIII(Equity Derivatives) Examination conducted by National Institute of Securities Markets to get certified for professional knowledge on Derivatives(F&O) Segment
- Extensively surveyed various correlation techniques for extraction of trends among various instrument pairs in order to predict market movement
- Implemented one of the above techniques to study lead/lag relationships among instruments and designed an appropriate trading strategy
- Coded and successfully back-tested the above mentioned strategy

LANDMARK CONDITIONED IMAGE GENERATION USING GANs
May 2018- July 2018

Research Intern, Adobe Research — *Mentor: Sunav Choudhary(Computer Scientist, Adobe Research)*

- Undertook KJ analysis of the problem area to identify and formulate the research problem "How to generate synthetic images subject to pose constraints?"
- Surveyed prior art in research literature to identify state-of-the art approaches to generative modeling for images for adapting to this research problem (Came up with a novel loss function that was responsible for intricate facial details in generated images)
- Constructed and trained a conditional Generative Adversarial Network that generates faces for dogs with only heatmap encoded input for facial landmarks(Trained and tested on Stanford Dogs Dataset)
- Worked with TensorFlow and Keras deep learning libraries in python to develop a prototype of the solution (In 256x256 generated images, detected facial landmarks were within 5 pixels of the desired position with high probability)

APPLICATION OF TRANSFER LEARNING IN MOTOR IMAGERY IN BRAIN-COMPUTER INTERFACE
July 2018- Nov 2018

Undergraduate Project-I — *Mentor: Prof. Laxmidhar Behera*

- Exhaustively studied standard techniques used for transfer learning in brain-computer interface
- Focused on improving two class motor imagery classification accuracy by learning efficient model on extremely scarce training dataset(BCI Competition-IV Dataset)
- Application of Multi-task Learning across subjects by encoding common information in the form of a joint prior led to an overall best accuracy of 55.35%
- Used a matrix analogous to covariance matrix of CSP(Common Spatial Patterns) to decide on the subjects used for creating an initial model of a novel test subject
- Usage of Riemann Geometry for data transformation across subjects shot up the accuracy to 60.25%

BEST OFFSET PREFETCHING WITH BEST DEGREE
Jan 2019- April 2019

Research Project — *Mentor: Prof. Biswabandan Panda*

- Extensively read about prefetching and surveyed state-of-the-art hardware prefetching techniques
- Took into account the correlation of a prefetching offset with every memory access and impact on performance caused by variation in prefetching degree
- Modified score update calaculation of Best-Offset prefetcher to ensure better information utilization during training
- Used recursive deep polling for obtaining the best prefetching degree in a dynamic way
- Our prefetcher extended the performance(overall IPC) over baseline(no prefetch) by 33.9% and outperformed Best-Offset prefetcher by 4.5%
- Performance increment of 36.8% over the baseline was observed when our prefetcher was used at L2 and next-line prefetcher was at L1

ROBUST FEATURE EXTRACTION USING DEEP STACKED AUTOENCODER May 2017- July 2017

SURGE(Student Undergraduate Research Graduate Excellence) Project *Mentor: Prof. Nishchal Verma*

- Extracted distinct, uncorrelated and well informative feature encodings(resulted in high test accuracy) from the Lung Cancer Dataset and determined the right choice of parameter initialization values in this problem of non-convex optimization
- Obtained pen-stroke like features when implemented on MNIST database of hand-written digits, using suitable data preprocessing and training with multiple fine-tunings of a stacked autoencoder consisting of three different cascaded autoencoder
- Verified the superior quality of feature extraction of stacked autoencoder over an autoencoder(three layered deep neural network)

NEGATIVE CAPACITANCE FET MODEL 1.0.0 IMPLEMENTATION IN MATLAB June 2017- July 2017

RTE(Research Track Exploration) Project [Remote Project] *Mentor: Prof. Shaloo Rakheja(NYU Tandon)*

- Gained full-scale knowledge of nanoscale MOSFETS and the device physics involved with it on nanoHUB-U
- Understood the compact model on NCFETs involving LK equations and variation of different device parameters
- Extensively studied Verilog-A and translated the model implementation available in it to MATLAB
- Simulated the created MATLAB code for the model and compared the results with available experimental data to get a strong agreement

ACADEMIC PROJECTS

LINKING RF TRANSCEIVER AND MICRO-CONTROLLER THROUGH AN INTERFACE* Jan 2019- Present

Undergraduate Project-II *Mentor: Prof. Shafi Qureshi*

- Carried out an in-depth study of the structural blocks of Transceiver and Micro-Controller
- Comprehensively read about the functioning of the interface connecting Transceiver and Micro-Controller and associated protocols
- The task related to development of the interface is in progress

CRITICAL ANALYSIS OF STANDARD DATA PREFETCHERS July 2019- November 2019

Course Project(CS-622A) *Instructor: Prof. Mainak Chaudhari*

- Exhaustively surveyed top hardware prefetchers that presented at Data Prefetching Championship-3
- Analyzed the causes behind their shortfalls and rigorously compared them on various parameters like accuracy, coverage, etc.
- Received 100% percent marks in the project along with a note of appreciation from the professor

MODEL FOR QUESTION ANSWERING July 2017 - Nov 2017

Course Project(CS-771A) *Instructor: Prof. Purushottam Kar*

- Implemented a model of machine comprehension based on the paper “Bi-directional Attention Flow Model(BiDAF)”
- Trained and tested the contextual query answering model on Stanford Question Answering Dataset(SQuAD)

FEW-SHOT LEARNING UNDER DOMAIN SHIFT USING ADVERSARIAL DOMAIN ADAPTATION Jan 2019 - April 2019

Course Project(CS-698X) *Instructor: Prof. Piyush Rai*

- Aimed at training model using dataset from one domain and testing it on dataset from another domain using domain adaptation and meta-learning
- Modified standard Meta-Learning Domain Adaptation(MLDA) model by extracting the domain shift related part out of the episodic training loop so as to reduce training time
- Data from multiple domains can be used for the learning process as the modified MLDA removes domain identity
- Images from different domains are disintegrated into features lying in Common Latent Feature Space
- Implemented the two phase model in Tensorflow wherein the first phase performs domain adaptation(to remove domain related biases) and the second phase does meta learning(on common latent features)

GEM OS DEVELOPMENT July 2018 - Nov 2018

Course Project(CS-330A) *Instructor: Prof. Debadatta Mishra*

- Developed a vanilla operating system named GemOS that models a real-time operating system
- Implemented Virtualization in the form of Address Translation, System Calls, Exception Handlers, Interrupt Handlers, Scheduling Policy, Inter-process communication(Signals), Clone and Sleep Functionality
- Implemented Persistence by creating a new file system subject to provided memory specifications

MINI C COMPILER Jan 2019 - April 2019

Course Project(CS-335A) *Instructor: Prof. Amey Karkare*

- Developed a basic compiler for a subset of C language that works on MIPS machine
- Implemented Lexical Analysis, Syntax Analysis, Semantic Analysis at the front end using lex and yacc tools
- Target code generation from intermediate code was accomplished at the back-end and it was evaluated using a Spim MIPS simulator

SAMPLING BASED MOTION PLANNING Jan 2019 - April 2019

Course Project(CS-638A) *Instructor: Prof. Indranil Saha*

- Generated the optimal path using SAT and SMT based solver for multi robot motion planning with constraints

- Implemented motion planner for multi robot using NuSMV model checker
- Presented a paper on Sampling Based Motion Planning, a geometry-based, multilayered synergistic approach which involved LTL formula based temporal goals

BOMBERMAN GAME DEVELOPMENT(BROWSER VERSION) July 2018 - Nov 2018

Course Project(CS-252A) *Instructor: Prof. Nisheeth Srivastav*

- Used Phaser 3 to develop the browser version of the popular BomberMan video game
- Implemented additional features like login-based saving/restoring of game state, dynamic increment in difficulty level after some pre-defined time interval and retrying the game(after "Game Over" message) without reloading the browser

SUDOKU GENERATOR AND SOLVER July 2018 - Nov 2018

Course Project(CS-202A) *Instructor: Prof. Subhajit Roy*

- Built a Sudoku Generator that emits a random Sudoku Puzzle every time it executes and Sudoku Solver that solves an input sudoku using minisat
- Developed a naive MiniSAT(using policies like unit propagation, maximal literal selection, randomization, etc. that solves any propositional logic formula

IMPROVED BANDGAP REFERENCE WITH HIGH PSR July 2018- Nov 2018

Course Project(EE-610A) *Instructor: Prof. Shafi Qureshi*

- Implemented a bandgap reference circuit(on Mentor Graphics) based on an IEEE paper(using Voltage Subtractor to enhance Brokaw Bandgap reference circuit)
- Analyzed the design to compute ideal values of different components to perform simulation
- Performed various checks like DRC , LVS etc. to ensure correctness of implementation before simulating the circuit

VOICE CONTROLLED ROBOTIC CAR Jan 2018 - April 2018

Course Project(EE-381A) *Instructor: Prof. Baquer Mazhari*

- Configured IFTTT to act as a bridge between Blynk App and Google Assistant over a Wifi network
- Wired a circuit, involving NodeMCU along with ESP board, to channel the command from Blynk App to Robotic Car

TECHNICAL SKILLS

Programming Languages: Proficient(C, C++, Python), Familiar(Java, Verilog-A, HTML, CSS, Javascript, R)

Libraries: Tensorflow, Keras, Pytorch

Software and Utilities: Bash, Docker, MATLAB, PIN, ChampSim, SAT, SMT, NuSMV, MicroCap, Mentor Graphics, PSPICE, Phaser 3

RELEVANT COURSES

Computer Science: Fundamentals of Computing; Data Structures & Algorithms-I & II; Introduction to Machine Learning Techniques; Computer Organization; Computing Laboratory-I & II; Operating Systems; Theory of Computation; Probability for Computer Science; Mathematical Logic; Compiler Design; Probabilistic Modeling and Inference; Computer Architecture; Formal Methods in Robotics and Automation; Advanced Computer Architecture; Advanced Topics in Data Structures & Algorithms

Electrical & Electronics: Microelectronics-I & II; Control System Analysis; Signals, Systems & Networks; Introduction to Electrical Engineering; Principles of Communication; Power Systems; Digital Electronics; Digital Signal Processing; Electromagnetic Theory; VLSI Circuit Design; Flexible Electronics; Semiconductor Device Modeling, Integrated Circuit Fabrication Technology

EXTRA-CURRICULAR ACTIVITIES

- Awarded certificates, for being in Top-3, in various Quizzes, Essay Writing, Elocution & Drawing Competitions conducted at school level
- Volunteered to provide service to the needy Cancer/Aids patients, by raising funds for the campaign launched by Caring Soul's Foundation
- Served as a Cadet of The National Cadet Corps (NCC), 2-UP-CTR Division, during the term of 2015-2016 at IIT Kanpur
- Excelled in Inter-School Drawing Competition conducted by Rajkot Art Vision in the year 2005