Radhit **Dedania**

Email: rdedania@uci.edu
Phone: +1 (949) 522-2493

EDUCATION

2022[1]	**Master of Science** (Computer Science)	University of California, Irvine	**4.0/4.0**
2020	**B.TECH**(DOUBLE MAJOR) (Computer Science - Electrical Engineering)	IIT Kanpur	**8.7/10.0**

TECHNICAL SKILLS

Programming Languages and Libraries: Proficient(C, C++, Python), Familiar(Java, Verilog-A), Tensorflow, Keras, Pytorch
Software and Utilities: Bash, Docker, MATLAB, PIN, ChampSim, SAT, SMT, NuSMV, MicroCap, Mentor Graphics

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)
- 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 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

LANDMARK CONDITIONED IMAGE GENERATION USING GANs
May 2018- July 2018

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

- Surveyed prior art in research literature to identify state-of-the art approaches to generative modeling for images
- Came up with a novel loss function that was responsible for intricate facial details in generated images
- Trained a conditional Generative Adversarial Network to generate dog faces with only heatmap encoded input for facial landmarks
- 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

RESEARCH EXPERIENCE

BEST OFFSET PREFETCHING WITH BEST DEGREE
January 2019- April 2019

Research Project — *Mentor: Prof. Biswabandan Panda, IITK*

- Extensively read about prefetching and surveyed state-of-the-art hardware prefetching techniques
- Took into account the correlation of a prefetching offset with memory access and performance variation caused by change in prefetching degree
- Modified score update calculation 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

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

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

- 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 BCI dataset
- Applied Multi-task Learning across subjects by encoding information in the form of a joint prior resulting in an overall best accuracy of 55.35%
- Used a matrix analogous to covariance matrix of Common Spatial Patterns to decide on the subjects for initial model of a novel test subject
- Usage of Riemann Geometry for data transformation across subjects shot up the accuracy to 60.25%

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

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

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

ACADEMIC PROJECTS

SOKOBAN SOLVER
October 2020- December 2020

Course Project(CS-271A) — *Instructor: Prof. Kalev Kask, UCI*

- Solved the Sokoban Puzzle problem by applying a rational agent in the form of A* search using Manhattan Heuristic
- Included pruning techniques like hash table for efficient lookup of reached states and valid state check to prune states having no legal moves
- Compared the performance of our model with other variants like UCS, IDS, DFS, etc. to gauge quality of the heuristic
- Obtained solution for puzzles up to level 8x8 with considerable board complexity and up to 12x12 with simpler board structure(max 4 boxes)

[1] in progress

CRITICAL ANALYSIS OF STANDARD DATA PREFETCHERS July 2019- November 2019
Course Project(CS-622A) *Instructor: Prof. Mainak Chaudhari, IITK*

- 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

MINI C COMPILER January 2019 - April 2019
Course Project(CS-335A) *Instructor: Prof. Amey Karkare, IITK*

- 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 January 2019 - April 2019
Course Project(CS-638A) *Instructor: Prof. Indranil Saha, IITK*

- 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

FEW-SHOT LEARNING UNDER DOMAIN SHIFT USING ADVERSARIAL DOMAIN ADAPTATION January 2019 - April 2019
Course Project(CS-698X) *Instructor: Prof. Piyush Rai, IITK*

- 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 - November 2018
Course Project(CS-330A) *Instructor: Prof. Debadatta Mishra, IITK*

- 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

SUDOKU GENERATOR AND SOLVER July 2018 - November 2018
Course Project(CS-202A) *Instructor: Prof. Subhajit Roy, IITK*

- 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

MODEL FOR QUESTION ANSWERING July 2017 - November 2017
Course Project(CS-771A) *Instructor: Prof. Purushottam Kar, IITK*

- 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)

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; Introduction to Artificial Intelligence; Introduction to Embedded Systems; Communication and Computer Networks

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

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**