RAHAVI SELVARAJAN

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PROFILE

Passionate and organized learner doing Master's degree in Electrical and Computer Engineering. Highly engrossed in fields like Data Science and Deep Learning. Mastered the skills like analytical thinking, and problem solving by doing research internships at IIT Palakkad and Indigenous 5G testbed project, IIT Madras. My bachelor thesis strengthened my knowledge on Machine Learning and data management and also enhanced my skills on team management and scientific writing. Acquired leadership qualities by coordinating technical events at college symposiums during undergrad.

EDUCATION

Master of Engineering in Electrical and Computer Engineering 2021 - 2023
University of Toronto, Canada.
CGPA : 3.88/4.0
Courses: Introduction to Machine Learning (ECE1513), Big Data Science (MIE1628H), Trustworthy ML (ECE1784), Algorithms and Data Structures (ECE1762H)

Bachelor of Engineering in Electronics and Communication Engineering 2016 - 2020
Anna University, India.
CGPA : 3.73/4.0 (First Class with Distinction)
Courses: Engineering Mathematics, Probability and Random Processes, Image Processing, Signal Processing

SKILLS

Skills	Engineering Mathematics, Digital Signal Processing, Machine Learning, Convolutional Neural Networks (CNN), Statistical Modelling, Recommendation Systems
Software	Python, R, Pytorch, Keras, Tensorflow, MATLAB, C, Hadoop, Spark, Windows Powershell, Azure, LABView, Xilinx Vivado, Latex, MS Office, Linux, Git, SQL, Java

EXPERIENCE

Intern - JACOBB-Center for Applied Artificial Intelligence, Montreal Jan 2022 - Present
Anomaly detection and classification in 3D-images of sewer channels using transfer learning

- Working on the detection and classification of anomalies in sewer channels.
- Estimating the key characteristics of the defects present in the structured data and unstructured data obtained from the 3D camera.
- Transferring the knowledge learnt from the structured data to unstructured data.

Graduate Research Intern- Multimedia Laboratory, University of Toronto Oct 2020 - Dec 2021
Computational Pathology

- Developed an unsupervised deep learning network architecture which incorporated probabilistic modelling for multi-label image classification.
- Visualized the feature representations learnt by the network using AI visual explanation techniques.
- Worked with various statistical models and public biological datasets.

Research Intern - Indian Institute of Technology, Madras Dec 2019 - Mar 2020
Implementation of Digital Pre-Distortion Module using Xilinx Vivado on FPGA board

- Implemented the DPD IP design in Xilinx Vivado
- Wrote Verilog Testbench for the DPD IP
- Optimized the DPD IP core for achieving low Adjacent Channel Leakage Ratio
- Programmed the ZCU111 FPGA board with the synthesized design

Summer Research Intern - Indian Institute of Technology, Palakkad May 2019 - June 2019
Mathematical Modeling of Non-Linear Communication Channels and its Estimation using Deep Learning

- Simulated non-linear channels using Volterra, Wiener and Hammerstein Models in MATLAB
- Added random polynomial equations of higher orders as a non-linearity
- Trained a deep learning network for the estimation of non-linear polynomial co-efficients.

TEACHING EXPERIENCE

Graduate Teaching Assistant - University of Toronto Jan 2022 - Present
MIE253H1 - Data Modelling

- Creating assignments on Data loading, accessing and SQL.
- Grading assignments and exams.
- Responsible for setting question paper for mid term and final exam.

PUBLICATIONS

Supervised Multilabel Contrastive Learning for Computational Pathology
Submitted to CVPR 2022

Prediction of Cardiovascular Disease from Retinal Fundus image using Neural Networks [paper]
International Journal of Advanced Science and Technology, 2020

Health Monitoring of Soldiers using Efficient MANET Protocol [paper]
IEEE Recent Advances in Intelligent Computing Systems, 2020

PROJECTS

Bosch Future Mobility Challenge On-going

- Extracted the video captured from the camera module attached to the micro-controller for computer vision applications.
- Implemented object detection algorithm - YOLO and Canny Edge detection algorithm for recognizing the obstacles and the road signs in front of the bot.

IMI Big Data and Artificial Intelligence Case Competition (Scotiabank)

- Developed a credit risk prediction model for the Scotiabank dataset.
- Used basic data science approaches to do exploratory data analysis on the dataset.
- Performed both binary classification and multi-class classification on the dataset provided by the Scotiabank.

Deep Query Attacks: A Reinforcement Learning Approach [link]

- We proposed a reinforcement learning framework which combined differential querying and structured grouping (tiling) of pixels.
- Utilized historical knowledge from previous queries in the training stage to learn more query-efficient attack strategies.
- Dsigned an RL agent which requires an attack dataset for training which need not be representative of the training dataset of the target model.

Netflix Movie Recommendation System

- Developed the movie recommendation engine using PySpark.
- Worked on the data from Netflix and performed data manipulation tasks like loading, cleaning, slicing and mapping.
- Used Alternating Least Squares (ALS) algorithm for the recommender system and optimized the algorithm with various parameter values.