SAWAN SINGH MAHARA

M.S Researcher

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EDUCATION

M.S by Research in Electrical Engineering
Indian Institute of Technology Dharwad

📅 2019 – Ongoing 📍 Dharwad, India

Communication Efficient Federated Learning.
Thesis supervisor Dr. Bharath B.N

B.E in Electronics and Communication Engineering
PESIT-Bangalore South Campus

📅 2014 – 2018 📍 Bangalore, India

SOFTWARE SKILLS

Python, MATLAB ●●●●●

C, Excel, Tensorflow ●●●●○

INTERESTS

Probability and Random Processes

Machine Learning | Federated Learning

NVIDIA DeepStream | Edge Computing

Reinforcement Learning | Deep Learning

High Performance Computing

Information Theory | Wireless Communication

COURSES

Probability and Random Processes (Grad)

Statistical Pattern Recognition

Wireless Communication | Linear Algebra (Grad)

TA WORK

Probability and Random Processes (Grad)

Convex Optimisation

Wireless Communication | Control Systems

RESEARCH WORK

NVIDIA Jetson and Federated Learning
Ongoing Work

📅 2021 📍 IIT Dharwad

The aim is to network NVIDIA Jetson Nano devices to coordinate and emulate federated edge learning scenarios. The scenarios being looked into are distributed object tracking and detection. Using transfer learning, pre-trained object detection/tracking models are being adapted to work on custom data implemented with the NVIDIA DeepStream SDK. Future plans involve coordinating training on the institute NVIDIA DGXA100 and creating docker containers to ease deployability on any Jetson Nanos or other similar edge devices.

Multi-task Federated Edge Learning (Mt-FeeL) With SignSGD
ISIT (International Symposium on Information Theory)

📅 2021 📍 Melbourne, Victoria, Australia

The area of Federated Learning aims to perform machine learning using devices in a network, with data spread (federated) across them. We proposed a federated learning algorithm which reduced communication overhead between devices. Work was done to prove the convergence of the algorithm as well.
Collaborators: Shruti M. and Dr. Bharath B.N

Multi-task Federated Edge Learning (Mt-FeeL) With SignSGD in a Rayleigh Fading Channel
IEEE Transactions on Communications

📅 2021

An extension of *Multi-task Federated Edge Learning (MtFeeL) With SignSGD* considering a Rayleigh fading wireless channel between the main server and the nodes. An analysis of the convergence rate of the proposed algorithm when the signed gradient vector was corrupted was done, and experimentally verified as well.
Collaborators: Shruti M. and Dr. Bharath B.N

PROJECT WORK

Radar Based Projects
Internship

📅 2020 📍 Euprime, Bangalore

Created scripts, documented the setup of the hardware for classified projects in signal processing at the company.

PROJECT WORK (CONT.)

Human Activity Recognition Using Wi-Fi Channel State Information

Summer Internship Project

📅 *2019*　　　📍 *IIT Dharwad*

Various human actions like running, walking, standing up, etc were classified using the channel state information of commercial wireless networking equipment.
An Inflated 3D Convolutional Neural Network was used for classification.
Collaborated with Dr. Bharath B.N

5G mm-Wave End to End Backhaul Communication System

Summer Internship Project (MMRFIC)

📅 *2019*　　　📍 *IIT Dharwad*

Worked on the initial design and development of an end to end 5G mm-Wave backhaul network.
Specifically, the block level design of the system and the packet frame structure design.
Collaborated with Dr. Bharath B.Nand Dr. Naveen M.B

Offline SSVEP Classification using Riemann Geometry

B.E. Final Year Project

📅 *2018*　　　📍 *PESIT-Bangalore South Campus*

A brain computer interfacing project work that deals in classifying EEG signals of people under an SSVEP (Steady State Visually Evoked Potential) state. The objective of the project was to construct a classifier in MATLAB that could extract windows of data from a stored EEG stream and classify them as an SSVEP state or not, using a Riemann distance metric as the crux of the implementation.

EXTRA COURSE WORK

Deep Learning:
An introductory NPTEL course on Deep Learning and Machine Learning.
The general framework of implementing learning algorithms, PCA, auto-encoders, adaptive gradient descent were some of the topics discussed.
Credential ID: NPTEL18CS41S11151613

Applied Optimization for Wireless, Machine Learning, Big Data:
An NPTEL course laying down the fundamentals of general optimisation techniques used in various MIMO systems.
Convex set theory, beamforming fundamentals, compressive sensing were some of the topics discussed.
Credential ID: NPTEL18EE31S21151415

Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning:
Detailing the implementation of Tensorflow.
Credentials: Credential Link