Education

Johns Hopkins University
MSE in Biomedical Engineering
Courses: Machine Learning, Deep Learning, Data Science, Neural Implants and Interfaces, Biomedical Instrumentation, Neuro Data Design, Machine Learning for Signal Processing, Radiology for Engineers

Course Assistant: Biomedical Data Science

Indian Institute of Technology (BHU) Varanasi
Dual Degree - B.Tech.(Honors) in Bioengineering and M.Tech. in Biomedical Technology

Courses: Biomedical Imaging and Instrumentation, Signal and Image Processing, Artificial Intelligence, Medical imaging modalities, Mathematical modelling and simulation, BioMEMS and Biosensors, Fundamentals of management, Interpersonal dynamics, Human relations at work

Course Assistant: Biomaterials, Composite Materials, Electronic Measurements and Instrumentation Lab

Internship Experience

Center for Data Science in Emergency Medicine, Johns Hopkins Medicine and University (Feb 2021 - Present)
Data Science Intern
- Cleaned and normalized Electronic Health Record (EHR) data collected from 5 Emergency Departments (ED) in Baltimore.
- Collaborated with the ED clinicians to extract meaningful features from the EHR data for prediction of Acute Kidney Injury (AKI) in ED patients.
- Prepared a Data Dictionary to make the complicated EHR data easily understandable to a team of Data Scientists.
- Currently working on deploying a Random Forest model to identify patients with high risk of Acute Kidney Injury. (Maybe change this to “deployed” and mention 1.7 hours time)
- Actively involved in end-to-end development of a Machine Learning based Clinical Decision Support tool for Acute Kidney Injury prediction.

Indian Institute of Technology, Mandi (June 2017 - July 2017)
Low cost and Low magnetic field MRI
- Defined the design parameters for electromagnetic coils that can replace the conventional magnets used in MRI.
- Validated the design parameters by simulating the electromagnetic coils in COMSOL Multiphysics.
- Built a prototype hardware for a high power constant current source.

Research Experience

Seizure induced brain activities in Glut1-DS patients using simultaneous EEG-fMRI (Aug 2020 - Present)
Dept. of Radiology, Johns Hopkins School of Medicine
- Studied the brain activation/deactivation patterns during seizure in Glut1-DS patients using simultaneous EEG and fMRI.
- Applied Generalized Linear Model on EEG and fMRI signals to analyze the underlying regional seizure activity pattern.
- Analyzed the effect of seizure on various brain networks using Independent Component Analysis (ICA).

Brain Computer Interface using Machine Learning for wheelchair control (Jan 2017 – Dec 2018)
- Designed an EEG-based Brain Computer Interface system to control motion of a wheelchair.
- Developed a novel algorithm for online feature extraction of SSVEP EEG signals using combination of Canonical Correlation Analysis (CCA) and Individual Template CCA for better classification.
- Classified the EEG data in real-time using Support Vector Machines (SVM) to identify the user's command with 93% Accuracy, 99% Precision and 91 bits/min Information Transfer Rate (ITR).
- Established and integrated equipment for Brain Computer Interface projects in the lab.

Projects

Decoding Auditory Attention from EEG Data Using Deep Learning (Sep 2019 – Dec 2019)
Johns Hopkins University
- Implemented a linear method Neural Network to estimate attention of listener from EEG data in multi-speaker environment.
- Designed a Convolutional Neural Network structure to perform the same task with better accuracy.

Detection of pneumonia from chest X-Ray images using Deep Learning (April 2020)
Johns Hopkins University
- Deployed a Deep Learning model using Convolutional Neural Network architecture to detect pneumonia in patients using chest X-Ray images with 93% accuracy.

pyAutomagic – python-based package for pre-processing of EEG data (Sep 2019 - Dec 2019)
Johns Hopkins University
- Worked in a team of 6 students to develop a complete python-based package for preprocessing EEG data.
- Developed python scripts to read structured EEG data, employ user-requested preprocessing algorithms and save the results in appropriate format.
- Prepared python notebooks to demonstrate use of the package.
- Incorporated full support for Brain Imaging Data Structure (BIDS) format.
- (Maybe mention something about RPCA or the preprocessing algo. If required)

Data Analysis dashboards (Mar 2020 - April 2020)
Johns Hopkins University
- A real-time live dashboard to visualize the spread of COVID-19 in the world.
- A dashboard to analyze trends in healthcare costs in USA and predict the costs using Random Forest.

Smart ring – heart activity monitor (Oct 2019)
- Designed a prototype thumb ring using PPG sensor to measure heart activity and detect irregularities.
- Integrated a haptic feedback system to alert users in case of irregularities such as sleep induced bradycardia.
- Authored mock patent, invention disclosure form and license term sheets for licensing the product.
- Negotiated license terms with licensor in a mock licensing session.

Gaming controller headset for quadriplegics Oct 2019
- Designed a gaming controller headset that only requires head movements to play video games.

- Achieved 2nd rank in Mario Kart competition using the designed gaming controller.
- Authored a mock research paper for the product with appropriate claims and figures.

NEURO
Epilepsy, spike detection

Epileptic seizure simulation April 2020
- Simulated the neuron res

Skills

Programming languages: python, MATLAB, R, SQL, maybe C++
Software and Technologies: Keras, PyTorch, sklearn, MATLAB, Simulink, RStudio, COMSOL Multiphysics, NI Multisim
Biomed/Neuro skills

Publication

Deep Soni, Nitesh Singh Malan, and Shiru Sharma. "CCA model with training approach to improve recognition rate of SSVEP in real time " in 2019 3rd International Conference on Artificial Intelligence and Virtual Reality (AIVR 2019) Singapore on July 27-29, 2019 - https://doi.org/10.1145/3348488.3348498

Bakchodi

Winner – Startup weekend Varanasi 2014