

Jigyasu Khandelwal

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EDUCATION

MS BY RESEARCH IN ECE

April 2020- Expected April 2023 |
International Institute of Information
Technology, Hyderabad
Hyderabad, Telangana
CGPA: 8.5 / 10

BACHELOR OF ENGINEERING IN ECE

June 2018 | RTU-UCE
Kota, Rajasthan
Percentage: 63.29/100

COURSEWORK

1.3.1 Offline

Wireless Communication
Signal Processing
Statistical Methods in Artificial
Intelligence
Digital Image Processing

Optimization Methods
Communication Systems

1.3.2 Online

Signal Processing (Aditya Jagannatham)
Wireless Communication (Aditya
Jagannatham)
Communication (Aditya Jagannatham)

ACHIEVEMENTS

- AIR-1064 in GATE(ECE) 2020, 98.72 percentile.

SKILLS

PROGRAMMING LANGUAGES

- Python | C++ | Verilog | SystemVerilog

SOFTWARE AND TOOLS

- MATLAB | MS Office | Latex | Arduino

DEEPLARNING FRAMEWORKS

- Tensorflow | Keras | Pytorch

IMAGING

- OpenCV | Segmentation | Feature Extraction | 3D Reconstruction

MACHINE LEARNING

- Deep Learning | Reinforcement learning | Supervised | Unsupervised

EXPERIENCE

INTERN AT RESEARCH AND DEVELOPMENT QUALCOMM BANGALORE | MODEM SYS TEAM

- Employed Reinforcement Learning to increase data rate.
- Created a simulator to calculate data rate from given specifications at much faster rates (Turbo-sim) as compared to the previously existing simulator.

RESEARCH ASSISTANT | SIGNAL PROCESSING AND COMMUNICATION RESEARCH CENTER

August 2020 - Present | IIIT | Hyderabad, Telangana

- Working on DoA estimation of correlated user at low SNR based on **spectrum** received by MULTiple Signal Classification algorithm using Convolutional Neural Network.
- Working on **Direction of Arrival estimation at the receiver in presence of Multi Path Components** with help of Spatial smoothing and reducing the limitations of **spatial smoothing by using neural network**.
- Worked on implementation of **MULTiple Signal Classification algorithm** by using **SVM**, formulating the problem statement firstly and then solving the optimization problem.
- Worked on **nu-SVM**, in this formulation we tried to develop a State Vector Machine by reducing only one error which we are concerned about.
- Worked on **localizing the user on the basis of Channel State Information and Received Signal Strength** present at the receiver, tried to use Neural network for this purpose.

PROJECTS

DOA ESTIMATION USING CASCADED NEURAL NETWORKS AND ANGLE CLASSIFICATION FOR COHERENT SIGNALS | DoA ESTIMATION (THESIS WORK)

- Demonstrated that the performance of the DoA estimation algorithm degrades significantly outside the range ($-60^\circ, 60^\circ$).
- Proposed a CaNN to improve the DoA estimation for coherent sources.

INTERNATIONAL TELECOMMUNICATION UNIT CHALLENGE | USER LOCALIZATION

- WALDO (Wireless Artificial intelligence Location DetectiOn): sensing using wireless communications and ML, localized user based on the received signal.
- A classification network was used to classify if a person was present in the section of the room (16 sections) based on the CSI.

DEEP REINFORCEMENT LEARNING FOR ROBUST BEAMFORMING IN IRS ASSISTED WIRELESS COMMUNICATIONS | INTELLIGENT REFLECTING SURFACES

- Access point(AP) power requirement is minimized by joint optimization of the AP's active beamforming and the IRS's passive beamforming.
- Deep Reinforcement Learning approach is used that can adapt the beamforming strategies from past experiences.

CERTIFICATION

- "Machine Learning" by Stanford University (Andrew NG).
- "Data Structures and Algorithm - Self Paced" by Geeks for Geeks.
- "Programming for Everybody(Python)" by University of Michigan.
- "Advanced Computer Vision with Tensorflow" by DeepLearning.AI
- "Data Structures" by University of California San Diego
- "Machine Learning Application in Signal Processing and communication engineering" by Electronics and ICT academy and Ministry of EIT, Government of India.

MINIMUM NUMBER OF RECEIVER ANTENNAS REQUIRED TO SATISFY OUTAGE PROBABILITY IN MASSIVE MIMO SYSTEMS | OUTAGE PROBABILITY

- Determined the minimum number of antennas required to satisfy outage probability constraints.

DIRECTION OF ARRIVAL ESTIMATION WITH SPATIAL SMOOTHING | DoA ESTIMATION IN PRESENCE OF MULTI PATH COMPONENTS

- Implemented Spatial Smoothing to estimate the DoA of Multi Path Components (correlated signals) at receiver. Spatial Smoothing increased the rank of receiver auto covariance matrix

MUSIC RECOMMENDER SYSTEM | SMAI

- Implemented different music recommender systems: Popularity based, collaborative filtering and Neural collaborative filtering.

MULTI-SCALE TEMPORAL FREQUENCY CONVOLUTIONAL NETWORK FOR SPEECH ENHANCEMENT | AUDIO PROCESSING

- Implemented a system consisting of deep learning and signal processing to simultaneously suppress echoes, noise, and reverberation.

MULTI-MICROPHONE SPEAKER SEPARATION BASED ON DEEP DOA ESTIMATION | U-NET

- Each Time-Frequency bin is dominated by a user, so for that bin, a neural network structure along with U-net was used to estimate the DoA of the user

GENETIC ALGORITHM | OPTIMIZATION METHODS

- Read about Genetic algorithm and used it to solve the traveling salesman problem, which is a combinatorial problem using crossover and mutation approaches.

SHIFT INVARIANT STRUCTURE IMPOSED CNN FOR DOA | CLASSIFICATION OF DoA

- Received auto-covariance matrix values were used to feed to a Convolutional neural network which classifies input into three classes based on the range of Direction of Arrival of the received signal.

DEEPMUSIC

- Eigenvalues of the auto covariance matrix were used to estimate the number of users present at the transmitter side, then convolutional neural network is used to estimate the Direction of Arrival of the uncorrelated signal.

CRAMER RAO BOUND ON MUSIC ALGORITHM | MATLAB

- Implemented the lower bound on the performance of MUSIC Algorithm.