RAGHU VAMSHI HEMADRI

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EDUCATION

BTech   **2017-21**
Electronics and Communication Engineering, National Institute of Technology, Warangal   *CGPA: 8.36/10*
12th   **2015-17**
MPC, Board of Intermediate Education, Telangana   *Percentage: 97.6%*

TECHNICAL SKILLS

- **Languages and Softwares:** C++, Python, Java, Robot Operating System (ROS), Perl, Shell, Unity
- **Deep Learning Frameworks:** TensorFlow, Keras, PyTorch, MXNet

EXPERIENCE

Oracle Corporation
Software Developer 2   *July 2021 to Present*
- Designing and developing Autonomous Health Services using Machine Learning for the Oracle Autonomous Database and Cloud
- This includes Real-time health monitoring, diagnosis and root cause analysis via a single interface, Secure log redaction, Continuous incident and log life cycle management, Anomaly timeline using ML with fault prediction corrective action.

PPSP Lab, MILA, University of Montreal
Machine Learning Researcher   *Sept 2021 to March 2022*
- Designing Multi-Agent RL algorithms based on social neuroscience to improve AI agents' learning, generalization, coordination.

Skylark Labs
Machine Learning Researcher   *June 2019 to March 2021*
- Led projects all focused on Deep Learning, including Age Invariant Kinship Analysis, Low Resolution face recognition, Disguised face recognition and Mask detection system

Indian Institute of Science, Banglore
Research Intern   *May 2019 to July 2019*
- Led a project focused on Non-Convex approaches to Robust principal Component Analysis and its applications to Computer Vision Problems like Background and foreground subtraction, Image Denoising and Image Inpainting
- Developed a non-convex optimization approach to RPCA outperforming the state of art

Hopstack Labs
Machine Learning Intern   *October 2018 to November 2018*
- Was part of project focused on developing a accurate indoor object positioning system using Machine Learning
- Used a DNNs trained using Particle Swarm Optimization for predicting accurate position of object using RSSI values from distantly placed Bluetooth beacons

SELECTED PROJECTS

Meta Learning without memorization with exact information estimation

- This project is improvision over Meta-Learning without Memorization. In this paper, the authors approximate the mutual information for tractability of loss function. Alternatively, this projects directly maximizes the mutual information without approximation, using the MI estimator MINE inturn improving results.

MAGNET: Multi-Agent Generative Network

- MAGNET is a multi agent cooperative learning based architecture for generating new data. MAGNET generates images similar to images in CelebA dataset. This is a dual agent cooperative game than the conventional competitive MAP learning like in GANs. The results are better than most of the proposed GAN variants.

Environment Adaptive Self multi task learning Navigation Robot

- Modified version of the paper 'Composable Action-Conditioned Predictors: Flexible Off-Policy Learning for Robot Navigation'
- Simulated RC and a real-world RC car that can gather data and train fully autonomously without any human provided labels beyond those needed to train the detectors, and then at test-time be able to accomplish a variety of multiple tasks

Non-Convex approaches to RPCA and applications to Computer Vision problems

- The method we developed transcend the problem of low-rank and sparse matrix decomposition and applicable to solve inverse problems often encountered in several areas. We developed an efficient alternative representation corresponding to the mini max-concave penalty (MCP): re-weighed MCP (RMCP), and re-weighted γ –penalty (RGP). This is current SOTA.

ChildrEN SafEty Retrieval (CENSER) System for Retrieval of Kidnapped Children from Brothels in Varanasi, India

- CENSER System was developed by me in collaboration with Skylark labs to retrieve the kidnapped children from brothels in India. The CENSER system uses kinship analysis as well as matches with the sketch of the child. This system uses Memory Augmented

ScatterNet ResNet Hybrid Network inspired from the complementary learning system theory. CENSER has been used in 14 raid operations by Guria NGO in Varanasi, India and has so far saved 6 girl children.

Log File Anomaly Detection

- Detection of anomalies in system logs using Machine Learning. This is a basic prototype based on autoencoder and a log parsing algorithm named Drain. More robust and accurate method will be updated soon.

Training Chat bots with RL

- Created a chat bot using Actor Critic Method on the Cornell Movie-Dialogues Corpus. Pre-trained the seq2seq model using cross entropy method and fine tuned it using A2C method.

Covi-Vac Bot

- A telegram bot that shows the availability of covid-19 vaccine around the user. Also, notifies the user upon new vaccine slots.

Stocks Trading using RL

- Created a trading agent and custom Gym environment using RL. Designed two different architectures: a feed-forward network with price history on input and a 1D convolution network. Both architectures used the DQN method.

Mask Detection and Offender Recognition(MADOR) System

- (MADOR) System was developed by me in collaboration with Skylark labs. Our MADOR system can detect individuals without mask, using deep learning, and alerts (system or phone, messages) the authorities. The faces of the offenders can also be added to the database and recognised later by matching against a database.

An Intelligent Communication System based on β-VAE

- Designed a new communication system based on Variational Auto Encoders. The designed system can operate under Additive Wide Gaussian Noise (AWGN) and Rayleigh fading channels. The CNN based VAE architecture performs the encoding and modulation at the transmitter, whereas decoding and demodulation at the receiver.

Meta-heuristics and it's applications to color quantization

- Studied different meta-heuristic algorithms and color-quantization methods and developed a new color-quantization algorithm based on JAYA algorithm. This work is presented in a conference.

SELECTED PUBLICATIONS

Journal Papers

- R. Hemadri*, P. Pokala* and C. Seelamantula, "Iteratively Reweighted Minimax-Concave Penalty Minimization for Accurate Low-rank Plus Sparse Matrix Decomposition" in IEEE Transactions on Pattern Analysis Machine Intelligence, vol. , no. 01, pp. 1-1, 5555. doi: 10.1109/TPAMI.2021.3122259 https://doi.ieeecomputersociety.org/10.1109/TPAMI.2021.3122259
  *Both the authors have equal contribution

- Raghu Vamshi Hemadri, Akshay Rayaluru, Rahul Jashvantbhai Pandya, AEVB-Comm: An Intelligent CommunicationSystem based on AEVBs, arXiv:2005.09391, PrePrint: https://arxiv.org/abs/2005.09391, updated version: https://bit.ly/aevb_comm

Conference Papers

- Raghu Vamshi Hemadri, Amarjot Singh, and Ajeet Singh, ChildrEN SafEty and Rescue (CENSER) System for Trafficked Children from Brothels in India, Accepted to AAAI 2022, Private Link: https://bit.ly/2QWcLwk
- Hemadri R.V., Jatoth R.K. (2020) Jaya Algorithm Based Intelligent Color Reduction. In: Venkata Rao R., Taler J. (eds) Advanced Engineering Optimization Through Intelligent Techniques. Advances in Intelligent Systems and Computing, vol 949. Springer, Singapore DOI: https://doi.org/10.1007/978-981-13-8196-6_18

ACHIEVEMENTS

- **Best out going student** of 2021 batch in National Institute of Technology, Warangal
- **Best all-rounder** of 2021 batch in National Institute of Technology, Warangal
- Selected for **Google Research AI Summer School program 2020**, one among **150** global selections
- Received Merit Scholarship from the home university for three out of four years for standing in top 10 in the department
- Represented NIT Warangal in All India InterNIT badminton championship as extra player in AY 2018-19
- Qualified for pre-final round of **International Physics Olympiad** in 12th class

POSITIONS OF RESPONSIBILITY

- General Secretary(President) for the Electronic Armatures and HAM club, NITW. EA&HAM is the largest technical club in NITW
- Held positions like workforce in university fests(Technozion and SpringSpree) for Quality Control Management department

ADDITIONAL CERTIFICATIONS/BOOKS PURSUED

- **Machine Learning:** Probablistic Graphical Models; Machine Learning Engineering for Production (MLOps); The Deep Learning Book by Ian Goodfellow; Machine Learning by Andrew NG; Practical Machine Learning with TensowFlow, NPTEL; Deep Reinforcement Learning Nanodegree, Udacity
- **Finance:** Quantitative and Algorithmic Trading; Behavioural Finance