Mohit Agarwal

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Research Interests

| Brain-Computer Interfaces
| Reinforcement Learning
| Human-In-The-Loop ML
| Ubiquitous Computing
| Machine/Deep Learning

Selected Coursework

Computer Science
Machine Learning
Deep Learning
Artificial Intelligence
Computation and Brain
Information Visualization
Applied Cryptography
Mobile Computing
Data Structure & Algorithms

Mathematics
Probability & Statistics
Linear Algebra
Convex Optimization

Technical Skills

Programming Languages
• **Python** • MATLAB • C/C++ • Java • R Web: • HTML • CSS • d3 • JS
Deep Learning Frameworks
• **Tensorflow** • Torch

Selected Awards

• **2nd Position Worldwide** in ISBI Melanoma Detection Challenge
• **Semi-Finalist** Qualcomm Innovation Fellowship'18

Responsibilities

PC Member
• ICWSM'20
Session Chair
• Allerton'19
Reviewer
• CHI, CogSci, IMWUT, ICWSM, IEEE TMC, MobileHCI, AutomotiveUI

Education

Georgia Institute of Technology *Fall'14 - Present (USA)*
MS/PhD in Electrical and Computer Engineering | **GPA: 4.0/4.0**
Advisor: Prof. Raghupathy Sivakumar | Expected Graduation: Fall 2020

Indian Institute of Technology Kanpur *Fall'10 - Spring'14 (India)*
Bachelors in Electrical Engineering | **GPA: 8.7/10.0**

Internships

Apple | Wireless Technologies *Summer'18 (USA)*
RAT Simulator: Developed a system-level discrete event simulator in C++ to characterize and optimize the parameters of a radio-access technology (undisclosed, and developed in-house)

Lawrence Livermore National Labs | Machine Learning *Summer'17 (USA)*
High Dimensional Spectral Sampling Methods: Automated pair-correlation function estimation for arbitrary point clouds (traditionally requires manual tuning or multiple days of MD simulation)

Cisco | Deep Learning *Summer'16 (USA)*
Video Action Classification: Designed DNNs using LSTMs in Tensorflow, for action recognition in video clips using UCF-101 dataset| Proposed stateful model perfomed with $>$ 25% accuracy improvement

Syracuse University | Wireless Communication *Summer'13 (USA)*
Automatic Modulation Classification in WSNs: Developed algorithm for automatic identification of digital modulation in wireless communication in the presence of noisy environment using Bayesian model | Proposed *Collapsed Gibbs sampling* based approach, with $>$ 90% accuracy for higher-order QAMs

Selected Research Projects

Multi-Human Assisted Learning for Machine Agents using EEG *Fall'18 - Present*
| Brain-Computer Interfaces (BCIs) and Reinforcement Learning [Doctoral Research Work]
- Research, design and develop an interesting solution paradigm allowing humans to assist RL algorithms without burdening human-in-the-loop through EEG-based brain waves
- Demonstration of the impact of our approach in improving state-of-the-art RL algorithms (e.g., DQN) by developing multiple Atari-like discrete-grid based games in OpenAI Gym
- Experimentally showed that error-potentials can be learned in a zero-shot manner (with **AUC > 0.8**), and achieves **2.25x acceleration** in training while making **75.56%** fewer queries

Low-Power Command Detection for BCI Wearables *Fall'16 - Spring'18*
| BCIs, Ubiquitous Computing and Statistical Learning [Doctoral Research Work]
- Proposed a wakeup command design and detection strategy enabling always-on BCI wearables to run on low-power mode achieving **2.7x** improvement in battery life
- Proposed algorithm to self-learn and detect eye-blinks in user brainwaves with **98% accuracy**

Skin Lesion Analysis towards Melanoma Detection *Spring'16*
| Deep Learning
- Automated skin cancer detection by proposing CNN based deep architectures for skin lesion classification | **81.3%** accuracy, 2nd position worldwide in ISBI Melanoma Detection Challenge

Selected Publications

Mohit Agarwal and Raghupathy Sivakumar, "Charge for a whole day: Extending Battery Life for BCI Wearables using a Lightweight Wake-Up Command", **ACM CHI 2020**

Mohit Agarwal and Raghupathy Sivakumar, "BLINK: A Fully Automated Unsupervised Algorithm for Eye-Blink Detection in EEG Signals", **IEEE Allerton 2019**

Mohit Agarwal, Duo Xu, F. Fekri and Raghupathy Sivakumar, "Playing Games with Implicit Human Feedback", Workshop on Reinforcement Learning for Games at AAAI, 2020

Mohit Agarwal, Duo Xu, Faramarz Fekri and Raghupathy Sivakumar, "Accelerating Reinforcement Learning Agent with EEG-based Implicit Human Feedback", IEEE Transactions on Systems, Man, and Cybernetics: Systems (under submission)