Sameeksha Katoch

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EDUCATION

PhD Electrical Engineering 01/11/2016 – 07/11/2022
Arizona State University, Tempe, AZ
Dissertation: Effective Prior Selection and Knowledge Transfer for Deep Learning Applications
Research Areas: Deep Learning (Machine Learning), Signal Processing, Computer Vision

M.S. Electrical Engineering 01/11/2016 – 05/07/2018
Arizona State University, Tempe, AZ
Dissertation: Dynamic Texture Synthesis for Solar Applications
Research Areas: Machine Learning, Signal Processing, Computer Vision

Relevant Coursework: Neural Network and Deep Learning, Statistical Machine Learning, Adaptive Signal Processing, Digital Signal Processing, Computer Vision, Artificial Neural Computation (Generative AI), Linear Algebra and Convex Optimization, Digital Image and Video Processing, Detection/Estimation Theory, Random Signal Theory

TECHNICAL SKILLS

Programming Languages: Python (Numpy, Scipy, Pandas, etc.), C, C++, Matlab
Tools and libraries: Pytorch, Keras, TensorFlow, ONNX, Matlab, Git, Audition, SPSS, Latex, Microsoft Visio

WORK EXPERIENCE

Qualcomm Technologies, Inc., San Diego, CA: Senior Engineer (Machine Learning Researcher) 08/01/2022 – Present

- Developing memory efficient deep learning models using neural network architectures such as, Long Short Term Memory (LSTM), Recurrent Neural Networks (RNNs), Convolutional Neural Networks (CNNs) and Transformers (SepFormer) for multiple applications including Speech Separation and Speech Enhancement for products in VoiceUI and infotainment.
- Conducting experiments to tune relevant hyperparameters such as learning rate, chunk size and weight decay to make the model real time realizable. Convert trained models to ONNX format for on-chip implementations for multiple downstream products.
- Documenting research findings in manuscripts submitted to different publishing venues (NeurIPS, ICASSP, Interspeech) and developing live demonstrations to effectively communicate the application.

Lawrence Livermore National Labs, CA (Remote): Student Computing Intern 05/26/2020 – 08/19/2020

- Developed a structured meta-learning paradigm for effective domain adaptation and multi-task learning and showcased the effectiveness of the method using datasets such as iMaterialist, DeepFashion, iNaturalist, OfficeHome, PACS, CUB-200 and DomainNet.
- Performed a study using knee X-ray dataset to derive the meta information such as age, sex, gender and BMI information. This study was performed to understand whether such medical image data, preserves the privacy of the patients or if it is relatively easy to extract meta-information clues using machine learning. To this end, individual Efficient Net based deep learning models were developed in Pytorch for each meta information criterion.
- Developed encryption strategies using data manipulation techniques such as, mixup to perform patient data de-identification for safe data sharing within healthcare organizations. Developed privacy preserving machine learning models that were trained on conventional medical image data with a constraint such that, the trained models can also perform with high accuracy on encrypted data for machine learning based diagnostic applications.

Prime Solutions Group, Goodyear, AZ: Data Scientist Intern 05/16/2018 – 08/09/2018

- Developed a python script to pre-process multivariate weather data to study the seasonal trends and make the data suitable for predictive modelling.
- Developed a deep learning based predictive model using recurrent neural networks (RNNs) to perform irradiance prediction using weather attributes including cloud type, temperature, relative humidity, etc.

- Developed a deep learning based joint predictive model using Long Short Term Memory (LSTM) Neural Network for photovoltaic power forecasting based on multivariate weather data for the Arizona region.

PATENTS

- Systems and methods for skyline prediction for cyber-physical photovoltaic array control, US Patent 11,694,431, 2023.
- Adaptive video subsampling for energy efficient object detection, US Patent 11,481,881, 2022.
- Systems and methods for skyline prediction for cyber-physical photovoltaic array control, US Patent 11,132,551, 2021.
- Systems and methods for audio source separation via multi-scale feature learning, US Patent App. 17/121,131, 2021.

PUBLICATIONS

Journals

- Energy-Efficient Object Tracking Using Adaptive ROI Subsampling and Deep Reinforcement Learning, IEEE Access, 2023.
- Adaptive subsampling for ROI-based visual tracking: Algorithms and FPGA implementation, IEEE Access, 2022.
- Instruction tools for signal processing and machine learning for ion-channel sensors, International Journal of Virtual and Personal Learning Environments, 2022.
- A MACH filter-based reconstruction-free target detector and tracker for compressive sensing cameras, International Journal of Smart Security Technologies, 2020.
- DDxNet: A Multi-Specialty Diagnostic Model for ECG and EEG, Nature Scientific Reports, 2020.
- Automated Domain Discovery from Multiple Sources to Improve Zero-Shot Generalization, Arxiv, 2021.
- Improving multi-domain generalization through domain re-labeling, Arxiv, 2021
- Invenio: Discovering Hidden Relationships Between Tasks/Domains Using Structured Meta Learning, Arxiv, 2019.

Conferences

- Multi-Domain Ensembles for Domain Generalization, NeurIPS Distribution Shifts Workshop, 2021.
- Design and FPGA implementation of an adaptive video subsampling algorithm for energy-efficient single object tracking, IEEE ICIP, 2020.
- Adaptive Video Subsampling for Energy-Efficient Object Detection, 53rd Asilomar Conference, 2019.
- An REU Experience in Machine Learning and Computational Cameras, IEEE FIE, 2019.
- PV array fault detection using radial basis networks, 10th IISA, 2019.
- Formation-aware cloud segmentation of ground-based images with applications to PV systems, 10th IISA, 2019.
- Shading Prediction, Fault Detection, and Consensus Estimation for Solar Array Control, IEEE ICPS, 2018.
- Fast Non-Linear Methods for Dynamic Texture Video Prediction, 25th IEEE ICIP, 2018.
- A cyber-physical system approach for photovoltaic array monitoring and control, 8th IISA, 2017.
- Development of signal processing online labs using HTML5 and mobile platforms, IEEE FIE, 2017.
- Audio Source Separation via Multi-Scale Learning with Dilated Dense U-Nets, Arxiv, 2019.

Book Chapters

- Machine learning for solar array monitoring, optimization, and control, Springer Nature, 2022.
- A cyber-physical photovoltaic array monitoring and control system, IGI-Global, 2020.
- Reconstruction-free compressive vision for surveillance applications, Springer Nature, 2019.

PRESENTATIONS

- Robust Object Tracking for Adaptive ROI Subsampling using Deep Reinforcement Learning, ICCP 2021.
- Effective Prior Selection and Knowledge Transfer, SenSIP Seminar, 2021.
- Cloud Category based Solar Irradiance Prediction, SenSIP Seminar, 2021.
- Deep RL for Energy-Efficient Adaptive Subsampling in Predictive Object Tracking, WiML, Neurips 2020.
- Improving Task and Domain Generalization using Structured Meta Learning, SenSIP Seminar, 2020.
- Solar Array Analytics and Optimization using Vision and Machine Learning, NCSS/IUCRC, 2019.
- An REU Experience in Machine Learning and Computational Cameras, FIE 2019.
- DDxNet: A Multi-Specialty Diagnostic Model for Clinical Time Series, SenSIP Seminar, 2019.
- Fast Non-Linear Methods for Dynamic Texture Video Prediction, ICIP Poster, Athens, Greece, 2018.
- Fast Non-Linear Methods for Dynamic Texture Prediction, SenSIP Seminar, 2018.

REVIEWER

- Reviewer- IEEE Access in 2018, 2019, 2021, 2022, 2023.
- Reviewer- IEEE/CVF Winter Conference on Applications of Computer Vision in 2023.
- Reviewer- KDD DSA14Sports Workshop in 2023**.**
- Reviewer- IEEE International Symposium on Circuits and Systems in 2023.
- Reviewer- IEEE Transactions on Biomedical Circuits and Systems in 2022.

TEACHING EXPERIENCE

- EEE407/591 - Digital Signal Processing: Teaching Assistant
- EEE334 - Circuits II: Teaching Assistant
- Mentor- Research Experience for Undergraduates (NSF-REU Program)

AWARDS

- IEEE Al Gross Award for Contribution to the field of engineering science 04/06/2019
- Grand Challenge Winner, 7th Arizona Student Energy Conference 11/09/2018

MEMBERSHIPS

- Institute of Electrical and Electronics Engineers Years Active - 2018-2019, 2021
- IEEE Young Professionals Years Active - 2018-2019, 2021
- IEEE Signal Processing Society Years Active - 2018-2019
- SenSIP Industry Consortium Years Active - 2016-2022