Salman Mohamadi

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Research Experience

Deep Learning Research Lab — West Virginia University
Graduate Research Assistant — *May 2020 - Present*
- Executed various SOTA deep learning generative models including various GAN models (Cycle GAN, Pix2pix, Conditional GAN, SRGAN, STARGAN) for image and time series datasets
- Developed a deep active learning model for data efficient classification on image data
- Developed a new model for self supervised representation learning for datasets at different scales, from CIFAR10/100 to ImageNet
- Developed multiple time series analysis and modeling framework for human genome sequences, age estimation using gene exppression data, age-related gene identification

Computer Vision Biometrics Research Lab — West Virginia University
Graduate Research — *May 2019 - May 2020*
- Developed a GAN-based model to simultaneously perform super-resolution and domain translation on Iris image data for identification purposes.

Advance Signal Processing Research Lab — Amirkabir University of Technology
Graduate Research Assistant — *Aug. 2014 - May 2019*
- Thorough investigation of time series prediction methods for non-stationary time series using Wavelet, and AR, MA, and ARIMA modeling
- Developing an accurate algorithm to process human and canine EEG signals for long term prediction of epileptic seizures up to one hour prior to the seizure onset
- Developing a linear-non-linear modeling algorithm for modeling highly volatile time series

Education

West Virginia University — Morgantown, WV
Doctor of Philosophy in Electrical Engineering [Deep/Machine Learning] GPA: 4.0 — *May 2019 – December 2023*
- Title: Active Uncertainty Representation Learning—Learning More From Less
(Advised by Dr. Donald Adjeroh and Dr. Gianfranco Doretto)

Selected Publications

- **Salman Mohamadi, Gianfranco Doretto, Donald Adjeroh**: "FUSSL: Fuzzy Uncertain Self-Supervised Learning" 2023 IEEE/CVF Winter Conference on Application of Computer Vision (**WACV 2023**), Jan. 2023

- **Salman Mohamadi, Gianfranco Doretto, Donald Adjeroh**: "Deep Active Ensemble Sampling" 2022 IEEE/CVF Asian Conference on Computer Vision (**ACCV 2022**), Dec. 2022

- **Moktari Mostofa, Salman Mohamadi, Nasser M Nasrabadi**: "Deep GAN-based Cross-Spectral Cross-Resolution Iris Recognition" (**IEEE Transaction 2021**)

- **Salman Mohamadi, Donald Adjeroh**: "An Information-Theoretic Framework for Identifying Age-Related Genes Using Human Dermal Fibroblast Transcriptome Data" 2021 IEEE International Conference on Bioinformatics and Biomedicine (**BIBM 2021**)

- **Salman Mohamadi, Gianfranco Doretto, Nasser Nasrabadi, Donald Adjeroh**: "Human Age Estimation from Gene Expression Data Using Artificial Neural Networks" 2021 IEEE International Conference on Bioinformatics and Biomedicine (**BIBM 2021**)

- **Salman Mohamadi, Donald Adjeroh**: "A New Framework For Spatial Modeling And Synthesis of Genomic Sequences" 2020 IEEE International Conference on Bioinformatics and Biomedicine (**BIBM 2020**), 3575-3584. , 16 June, 2020

- **Salman Mohamadi, Hamidreza Amindavar**: "ARIMA-GARCH Modeling For Epileptic Seizure Prediction" 2017 IEEE International Conference on Acoustics, Speech, and Signal Processing (**ICASSP 2017**)"

- **Salman Mohamadi, Gianfranco Doretto, Donald Adjeroh**: "More Synergy, Less Redundancy: Exploiting Joint Mutual Information for Self-Supervised Learning" 2023 IEEE International Conference on Image Processing **ICIP 2023**

- **Salman Mohamadi, Gianfranco Doretto, Donald Adjeroh**: "GUESS: Generative Uncertainty Ensemble For Self-Supervision", Submitterd to WACV 2024

Projects/Expertise

- **Data-Efficiency for Machine Learning, Deep Learning, and Computer Vision**:

  There is a significant need for data-efficient algorithms in AI for many applications including healthcare, security, and applications in many private and governmental entities. Following is a list of some of accomplished projects by me:

  1. Approximate Thompson Sampling for Deep Active Learning (**NSF funded - 2022**)
  2. Uncertainty Representation for Self-Supervised Learning (SSL) (**NSF funded - 2022**)
  3. Joint Mutual Information Decomposition for SSL (**NSF funded - 2023**)
  4. Designing and Implementing Multiple Deep Learning methods for Gene Expression Data for Aging Process and Genome Sequence Modeling (**NSF funded - 2020-2022**)

- **GAN Models**:
  1. Implemented various GAN models [STAR, CYCLE, VANILLA, Pix2pix, Conditional, etc] for Quality enhancement, and various image synthesis applications (**Departmental Scholarship - 2019-2021**)
  2. Designing a GAN-based framework for efficient cross-spectral and cross-resolution Iris Recognition (**Funded by US Center for Identification Technology Research (CITeR) - 2019)**

- **Signal and Times Series Modeling**:
  1. Long-Term EEG-based Epileptic Seizure Prediction using ARIMA and GARCH models, Wavelet, etc.
  2. Modeling Signals with High Volatility
  3. Causal Inference and Inference of Association on Gene Expression Data for Human Aging (**NSF funded - 2022**)

Current Research

Active and self-supervised visual feature learning
- *More robust SSL and AL models*
  - We re-consider uncertainty representation for AL and SSL models

Generative Models, i.e., VAE, 3D & 2D GAN
- *Adversarial synthesis*
  - Investigation of deep generative models that represent 3D scenes in neural radiance fields as well as 2D scenes
  - 3D model for self supervised learning

Leadership/ Awards

- **NSF Fellowship**: NSF fellowship (Bridges Digital Health NSF NRT Fellowships , 2 years with Stipends)
- **Phi Kappa Phi**: Member of The Honor Society of Phi Kappa Phi
- **Supervision**: Supervised graduate and undergraduate students in research topics under Electrical Engineering and Computer Science
- **Reviewer**: IEEE Access, Neural Network (Elsevier), IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP) , IJCB conference, etc

Research Interests

- **General**: Machine Learning (ML), Deep Learning (DL), Computer Vision, and Their application with Bioinformatics

- **Specific**: Generative Models (GANs, VAEs), Uncertainty Representation in Deep Learning, Self-Supervised Learning, and Active Learning

- **Others**: Getting machines to learn **hierarchical representation of action plans** (as opposed to hierarchical representation of perception which is in part solved by deep learning

Programming Skills

- **Platforms:** PyTorch, Tensorflow, PyCharm, TorchScript, MATLAB, Linux, Kinect-SDK

- **Languages:** Python, C#, C/C++