Salman Mohamadi

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salmanportal.github.io/

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", Submitted to WACV 2024
- **Salman Mohamadi, et al.**: "ChatGPT in the Age of Generative AI and Large Language Models: A Concise Survey", Recently submitted

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. A New Framework of Deep Active Learning for Computer Vision (**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)**
- **ChatGPT, Generative AI and LLMs**:
  1. ChatGPT in the Age of Generative AI and LLMs: A Concise Survey (**NFS funded - 2023**)
  2. How to Better Adapt with the New Wave of Generative AI
- **Signal and Times Series Modeling**:
  1. Long-Term EEG-based Epileptic Seizure Prediction using ARIMA and GARCH models, Wavelet, etc (**2014-2017**)
  2. Modeling Signals with High Volatility (**2018**)
  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
- **Generative AI, i.e., LLMs, ChatGPT, etc**
  Careful Development and Better Adaptation to Genetative AI,

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++

Hands-On Experience

- **Machine Learning**: Computer Vision , Deep Learning, Reinforcement Learning, Self-Supervised and Transfer Learning, Recommender Systems, Ensemble Learning, Bayesian Learning, Interpretability and Explainable AI, Anomaly Detection, Natural Language Processing (NLP), Uncertainty Representation, GAN and VAE, NeRF
- **Signal Processing**: Non-Stationary Signal Processing, EEG Modeling, Long-Term Seizure Prediction, Time Series Analysis, Genome Modeling, Kalman Filtering, Detection and Estimation Theory, Wavelet, Financial Data Analysis,
- **Image Processing**: Digital Image Processing, Camera Calibration and Perspective Modeling, 3-D Scene Reconstruction
- **Statistics**: Causal Inference, Bayesian and Frequentist Statistics, Statistical Learning, Multivariate Analysis, Spatial Statistics, Nonparametric Statistics, Statistical Inference in Machine Learning, Imbalanced Data Analysis, Thompson Sampling, Monte Carlo