Mohammadesmaeil Akbarpour ***Email: makbarpo@ualberta.ca, Tel: 825-333-1358***

Highlights:

- 15 months as a Visiting Professor at the ECE Department, University of Alberta, Canada, specializing in signal and image processing through deep learning (https://apps.ualberta.ca/directory/person/makbarpo).
- Seventeen years as a faculty member in the Department of Electrical & Medical Engineering, Shomal University, Iran (http://fmsua.shomal.ac.ir/profile/Akbarpour).
- Deep understanding of various Deep Neural Networks and their applications in image processing.
- Extensive experience with classical image processing algorithms and classifiers.
- Over 8 years of industrial experience in image and video processing.
- Proficiency in various optimization algorithms to enhance image processing techniques.
- Nine months of sabbatical leave experience as a Ph.D. student at the ECE Department, University of Alberta, Canada, specializing in classical image processing

Current research:

- Histopathological image segmentation to detect skin cancer (melanoma) region using deep learning
- **Database:** Digitized biopsies, collected at the Cross Cancer Institute, University of Alberta, Canada

Research interest:

- Signal and image processing, especially, focusing on the segmentation and classification of medical images.
- Machine learning
- Pattern recognition
- Deep Neural Network (DNN)
- Heuristic Optimization Algorithms (GA, PSO, ACO)

Research experience:

- **Visiting Professor at University of Alberta, Canada** **[01/2023-present]**
  Advisor: Prof. Mrinal Mandal
  - Applied a series of morphological operations to detect cancer regions in histopathological images collected at the Cross Cancer Institute, University of Alberta, using DNN. [12/2023-03/2024]
  - Implemented a new deep neural network (DNN) model based on the U-Net and ResNet architectures for nucleus segmentation in medical images within a Python environment. [03/2023-11/2023]
  - Converted all code for image segmentation from Matlab to Python, executed on a Linux system in Prof. Mandal's Lab. [01/2023-03/2023]

- **Faculty member at Shomal University, Iran** **[07/2010-present]**
  - Carried out natural image classification using classical machine learning models implemented in Matlab. The databases used were from Caltech101, Caltech5, and GRAZ-01. [05/2021-03/2022]
  - Crafted curriculum for "Python Image Processing" course. [04/2020-03/2021]
  - Utilized a genetic algorithm and an optimized fitness function to generate the optimal image patch for various applications in image processing. [08/2019-04/2020]
  - Created a DNN course curriculum with faculty collaboration. [03/2018-07/2018]
  - Hosted a workshop on medical image analysis and its future impact on medical science. [Dec, 2017]
  - Designed curriculum for "Matlab Image Processing" course. [02/2015-06/2015]
  - Implemented active contour for edge detection in medical images. [05/2014-10/2014]
  - Denoised µPET noise in x-ray images using Wavelet Packets. [01/2013-08/2013]
  - Improved image quality via Wavelet Coefficient thresholding for noise reduction. [2012]
  - Devised a novel color space for image processing via genetic algorithm. [07/2010-11/2011]

- **Visiting Professor at University of Alberta, Canada** **[01/2016-09/2016]**
  Advisor: Prof. Mrinal Mandal
  - Conducted natural image classification using classical machine learning models on datasets including Caltech101, Caltech5, and GRAZ-01. [06/2016-09/2016]
  - carried out extracting optimal features that exhibit high similarity with images within the same group, while also demonstrating significant differences from images in other groups for classical image classification. [04/2016-06/20116]
  - Discovered the optimal image patch and its complement for image classification. [01/2016-03/2016]

- **Doctor of Philosophy at University of Birjand, Iran** **[09/2012-09/2018]**
  Advisor: Prof. Nasser Mehrshad
  - implemented HMAX with human visual characteristics for object recognition. [02/2018-07/2018]
  - Performed object recognition on natural images using classical machine learning models with databases including Caltech101, Caltech5, and GRAZ-01. [11/2017-02/2018]
  - Introduced a novel classical algorithm for object recognition inspired by the Human Visual System. [03/2016-10/2017]
  - Extracted optimal features for classification, inspired by the Human Visual System, yielding superior results. [07/2015-03/2016]
  - Implemented Gaussian Mixture Model (GMM) for texture segmentation. [01/2015-05/2015]
  - Implemented Human Visual System (HVS) simulation in Matlab to enhance image classification algorithms. [06/2013-11/2014]

- **Master of Science at Amirkabir University, Iran** **[09/2002-07/2005]**
  Advisor: Prof. Hassan Taheri
  - Determined the optimal radius in Ad Hoc networks to minimize transfer time and traffic. [02/2004-07/2005]
  - Implemented the ZRP routing algorithm for Ad Hoc Wireless Networks on Linux. [07/2003-02/2004]

Industrial experience:

- **Monitoring system** **[02/2021-08/2021]**
  - Project: Monitoring truck tags, weight, and driver (via face recognition), permitting authorized drivers for arrivals and departures while calculating parking capacity. [Feb, 2021]
  - Installed cameras in various positions to capture truck tags and driver pictures. [Feb, 2021]
  - Implemented Matlab codes for object detection and face recognition, and prepared a database containing truck tags, weights, and driver faces. [03/2021-05/2021]
  - Implemented Matlab codes for object detection and face recognition, compared input data with the database, and tested for new input. [06/2021-07/2021]
  - Tested system in practical environment for three weeks with over 1800 cases. [Aug, 2021]

- **Welding approval system for gas pipe installations** **[01/2018-03/2021]**
  - Project: Gas pipe welding quality checks and approvals [Jan, 2018]
  - 2000 pictures were collected: 1500 approved, 500 not approved. [02/2018-07/2020]
  - Simulation: Implemented and trained convolutional network code in Matlab, then tested it with new images. [Aug, 2020]
  - Tested system in practical environment with 85 new cases. [09/2020-03/2021]

- **Control system** **[08/2016-12/2017]**
  - Project: transfer of molten materials between tanks, optimizing capacity usage to prevent overflow. [Aug, 2016]
  - Installed camera at optimal distance for full coverage without impact from heat on melting materials. [Sep, 2016]
  - Installed engine speed control system on the first tank. [Sep, 2016]
  - After five practical tests, I refined the code to regulate the first tank at 70% of the second tank's capacity, gradually reducing speed as the second tank fills. [10/2016-12/2017]
  - Tested system in practical environment over 8 days with more than 73 cases. [Dec, 2017]

- **Retail Store Video Analytics** **[05/2014-02/2015]**
  - Developed Video Analysis System for Retail Store Customer Satisfaction Assessment. [May, 2014]
  - Installed Cameras for Customer Video Capture [July, 2014]
  - Utilized MATLAB for Customer Satisfaction Tracking through Video Processing [08/2014-11/2014]
  - Tested and Refined Algorithms for Accurate Customer Behavior Analysis and Satisfaction Reporting to Owner [11/2014-01/2015]
  - Tested system in practical environment over one month with more than 17518 cases [Feb, 2015]

Honors:

- First rank among electronic engineering student in Ph.D. program, GPA:19.15
- Ranked 81th among 35,000 participants in the nationwide graduate entrance exam, Iran
- Invited speaker at internal electronics Conference, Azad Univercity, Babol, Iran

Academic qualification:

- Researcher at University of Alberta [01/2016-10/2016] & [01/2023-present]
- Faculty member, electrical and computer engineering department, Shomal University [2012-present]

Education:

- **Ph.D. student in Electronic Engineering, Birjand University, Iran. [09/2012-09/2018]**
  - **Thesis:** Design and computational implementation of an optimal combinational model for the object recognition inspired by the human visual system
  - **Courses:** Image processing, Pattern recognition, Advanced engineering mathematics, Evolutionary algorithms
- **M.Sc. Electronic Engineering, Amirkabir University, Tehran, Iran. [09/2002 –06/2005]**
  - **Thesis:** 'Implementation and optimization ZRP routing algorithm in Ad Hoc Wireless Networks Using LINUX'

Work experience:

- Faculty member, electrical and computer engineering department, Shomal University [2012-present]
- Director of Education, Shomal University, Amol, Iran [2014-2015] & [2017-2023]
- Head of the Department of Electrical Engineering, Shomal Univercity, Iran [2012-2013]
- Manager the all of the Laboratories, Shomal Univercity, Amol, Iran [2009-2012]

Publications:

- **M. Akbarpour**, M. Mandal, M. Hashemi Kamangar, "Novel patch selection based on object detection in HMAX for natural image classification", Signal, Image and Video Processing (2022) 16:1101–1108.
- **M. Akbarpour**, N. Mehrshad, M. Razavi, "New Effective Method for Object Recognition based on Probabilistic Pruning of Visual Characteristics in HMAX", Tabriz Journal of Electrical Engineering, vol. 49, no. 1, 2019.
- **M. Akbarpour**, N. Mehrshad, M. Razavi, "Object Recognition Inspiring HVS", Indonesian Journal of Electrical Engineering and Computer Science, Vol. 12, No. 2, November 2018, pp. 783~793, ISSN: 2502-4752.
- Aliabadian, **M. Akbarpour**, M. Yosefi, "Kernel Based Approach toward Automatic Object Detection and Tracking in Surveillance Systems", International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-2, Issue-1, 2012.
- **M. Akbarpour**, M. R. Karami Mollaei, "Image Enhancement by Thresholding on wavelet Coefficient", International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-2, Issue-3, 2012.
- S. M. Hosseini, **M.Akbarpour**, S.Amjadi and H.Mirsalari, "Genetic Algorithm -Based Color Space Generation," International Conference on Computer Engineering and Applications IPCSIT vol.2 (2011).
- E. Nadernejad, **M. Akbarpour**, Hamid Hassanpour. "µPET Data De-Noising Using Wavelet Packets," Contemporary Engineering Sciences, Vol. 1, 2008, no. 2, 91 – 104.
- **M. Akbarpour**, M. Mandal, "Nuclei segmentation of histopathological images using enhanced CNN-based model combined two technique inspiring ensemble model to detect Melanoma", Signal, Image and Video Processing, editing by professor Mandal

Teaching Experience:

- **Conducted weekly teaching sessions, graded assignments and exam papers for these courses titled:**
  Digital image processing, Neural Networks, Deep learning, VLSI, Engineering mathematics, Electrical Circuits I & II, Signals and Systems Analysis, Electronics I & II, Electric Measurement, at Shomal University
- **Workshops:**
  Digital image implementation by python and Matlab at Shomal University
- **Advisor for M.Sc. projects:**
  Texture segmentation with GMM, Using active contour in image edge detection, Implementation of various classifiers, Using GA to create a new color space, Using Wavelet in image processing, Image classification Human Visual System (HVS).

Software:

- Python, Matlab, OrCAD PSpice

Language Proficiency:

- **Persian:** Mother Tongue
- **English:** Fluent

Reference:

- Prof. Mrinal Mandal, Department of Electrical & Computer Engineering, University of Alberta, mmandal@ualberta.ca
- Prof. Nasser Mehrshad, Department of Electrical & Computer Eng, University of Birjand, nmehrshad@birjand.ac.ir
- Prof. Mehrdad Hashemi, Department of Electrical & Computer Eng, Shomal University, mh.kamangar@shomal.ac.ir

Links:

- **Link of Github:** https://github.com/smaeilakbarpour
- **Link of LinkedIn:** https://www.linkedin.com/in/mohammadesmaeil-akbarpour-08608b178/
- **Link of research gate:** https://www.researchgate.net/profile/Mohammadesmaeil-Akbarpour