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Research interests

- Artificial Intelligence and Machine Learning: Multimodal Learning, Geometric Deep Learning, Manifold Learning, Graph Neural Networks, Meta-Learning, Zero/Few-Shot Learning, Self-Supervised/Semi-Supervised Learning, Kernel Methods.
- Computer Vision and Image Processing
- Computational Intelligence and Soft Computing

Work experiences

2024	Researcher in Machine Learning for Computer Vision, GIPSA-Lab, Grenoble Institute of Technology (Grenoble INP), France, Research Title: “Multi-Modal Geometric Deep Learning in the Lack of Data Condition”.
2022-present	Head of Intelligent and Learning Systems (ILS) Research Lab, constituted of 21 people (4 professors and 17 PhD students), University of Isfahan, Isfahan, Iran.
2021-present	Associate Professor, Faculty of Computer Engineering, University of Isfahan, Isfahan, Iran.
2017-2021	Head of Artificial intelligence Department, Faculty of Computer Engineering, University of Isfahan, Isfahan, Iran.
2018 (6 months)	Visiting researcher in Machine Learning for Computer Vision, GIPSA-Lab, Grenoble Institute of Technology (Grenoble INP), France, Research Title: “Multi-Modal Manifold Analysis and Learning”.
2010-2021	Assistant Professor, Faculty of Computer Engineering, University of Isfahan, Isfahan, Iran.
2009 (2 months)	Advisor for an industrial project: Automatic defect detection and classification in steel sheets based on machine vision techniques, Esfahan's Mobarakeh Steel Company, Isfahan, Iran.

Education

PhD in Computer Engineering (Artificial Intelligence Specialty)
Amirkabir University of Technology, Tehran, Iran, December 2009
Dissertation Title: “Regional linear manifold topographic maps”
Supervisor: Prof. Dr. Reza Safabakhsh.

MSc in Computer Engineering (Artificial Intelligence Specialty)
Amirkabir University of Technology, Tehran, Iran, September 2001
Thesis Title: “Farsi handwritten word recognition using a continuous-density variable-duration hidden Markov model”
Supervisor: Prof. Dr. Reza Safabakhsh.

BSc in Computer Engineering (Hardware Specialty)
Isfahan University of Technology, Isfahan, Iran, January 1998

Teaching experience

Faculty of Computer Engineering, University of Isfahan, Isfahan, Iran

- Design and Analysis of Algorithms (Spring 2010 – present, Spring Semesters)
- Signals and Systems (Fall 2010 – present, Fall Semesters)
- Applied Linear Algebra (Spring 2023 – present)
- Statistical Pattern Recognition (Spring 2011 – present, Fall Semesters)
- Advanced Topics in Machine Learning (Spring 2011)
- Evolutionary Computation (Fall 2011, 2012)
- Machine Learning (Spring 2012 – present, Spring Semesters)
- Advanced Topics in Learning Theory (Spring 2012– Fall 2015, 9 Semesters)
- Advanced Topics in Pattern Recognition (Spring 2013 – present, Spring Semesters)
- Statistical Learning Theory (Spring 2017)

Computer Engineering Department, Amirkabir University of Technology, Tehran, Iran

- Computer Graphics (Fall 2003, Fall 2005, Fall 2006)

Electrical and Computer Engineering Department, Qazvin Azad University, Qazvin, Iran

- Computer Graphics (Fall 2005)
- Artificial Intelligence (Fall 2005, Spring 2005)

International Collaborations

2023-present Joint research projects with general topic "Multimodal geometric deep learning in the lackness of data conditions", GIPSA-Lab, Université Grenoble Alpes (UGA), France.

2015-2017 Joint research project with topic "Making metric learning algorithms invariant to transformations", Vision Systems Research Group, Hamburg University of Technology (TUHH), Germany.

2016-present Joint research projects with general topic "Multimodal manifold learning", GIPSA-Lab, Université Grenoble Alpes (UGA), France.

2017-present Joint research projects on accessible systems for persons with disabilities with topics "Mathematical expression recognition", "Scientific chart understanding",

"Persian speech recognition", "Image captioning", etc., ICT-Accessibility Lab, Zurich University of Applied Sciences (ZHAW), Switzerland.

2019-present Joint research project with topic "Multimodal sentiment and mental health analysis on social networks", Center of Artificial Intelligence and Data Science (CAIDS), Kansas State University, USA.

2020-present Joint research project with topic "Meta-learning on Riemannian manifolds", Department of Electrical and Computer Systems Engineering (ECSE), Monash University, Australia.

Book

P. Adibi, *Introduction to Machine Learning*, In Press.

Publications

Journal articles

M. Behmanesh, P. Adibi, S.M.S. Ehsani, and J. Chanussot, "Geometric Multimodal Deep Learning with Multi-Scaled Graph Wavelet Convolutional Network," *IEEE Transactions on Neural Networks and Learning Systems*, vol. 35, no. 5, pp. 6991-7005, 2024.

F. Fathinezhad, P Adibi, B Shoushtarian, J Chanussot, "Local and soft feature selection for value function approximation in batch reinforcement learning for robot navigation", *The Journal of Supercomputing*, 2024.

E. Hatefi, H Karshenas, P Adibi, "Distribution shift alignment in visual domain adaptation", *Expert Systems with Applications*, vol. 235, p. 121210, 2024.

R. Saeidimesineh, P. Adibi, H. Karshenas, A. Darvishy, "Parallel encoder–decoder framework for image captioning," *Knowledge-Based Systems*, vol. 282, p. 111056, 2023.

A. Mirkazemy, P. Adibi, S.M.S Ehsani, A. Darvishy, HP Hutter, "Mathematical expression recognition using a new deep neural mode", *Neural Networks*, vol. 167, pp. 865-87, 2023.

H. Tabealhojeh, P. Adibi, H. Karshenas, S.K. Roy, M. Harandi, "RMAML: Riemannian meta-learning with orthogonality constraint", *Pattern Recognition*, vol. 140, p. 109563, 2023.

A. Mazraeh-Farahani, P. Adibi, M. S. Ehsani, H.-P. Hutter, and A. Darvishy, "Automatic Chart Understanding: a Review," *IEEE Access*, vol. 11, pp. 76202-76221, 2023.

F Fathinezhad, P Adibi, B Shoushtarian, H Baradaran Kashani, J. Chanussot, "Soft dimensionality reduction for reinforcement data clustering", *World Wide Web*, 2023.

M. Behmanesh, P. Adibi, J. Chanussot, C. Jutten, and S.M.S. Ehsani, “Geometric Multimodal Learning Based on Local Signal Expansion for Joint Diagonalization,” *IEEE Transactions on Signal Processing*, vol. 69, pp. 1271-1286, 2021.

A. Pournemat, P. Adibi, and J. Chanussot, “Semisupervised Charting for Spectral Multimodal Manifold Learning and Alignment,” *Pattern Recognition*, vol. 111, 2021.

N. Farajian and P. Adibi, “Minority manifold regularization by stacked auto-encoder for imbalanced learning,” *Expert Systems with Applications*, vol. 169, 2021.

A. K. Ali, P. Adibi, and S. M. S. Ehsani, "Depth Map Reconstruction and Enhancement With Local and Patch Manifold Regularized Deep Depth Priors," *IEEE Access*, vol. 9, pp. 136111-136125, 2021.

E. Hatefi, H. Karshenas, and P. Adibi, “Conditional Probability Distribution Divergence Reduction in Visual Domain Adaptation,” *The CSI Journal on Computer Science and Engineering*, vol. 17, no. 2, 2020.

N. Farajian and P. Adibi, “DMRAE: discriminative manifold regularized auto-encoder for sparse and robust feature learning,” *Progress in Artificial Intelligence*, vol. 9, no. 3, pp. 263-274, 2020.

N. Farajian and P. Adibi, “Sparse, Robust and Discriminative Representation by Supervised Regularized Auto-encoder," *International Journal of Information & Communication Reasearch*, vol. 11, no. 2, pp. 29-37, 2019.

S. Ahmadkhani and P. Adibi, "2D Dimensionality Reduction Methods without Loss," *Journal of AI and Data Mining*, vol. 7, no. 1, pp. 201-210, 2019.

Z. Goudarzi, P. Adibi, R.R. Grigat and S.M.S. Ehsani, "Making metric learning algorithms invariant to transformations using a projection metric on Grassmann manifolds," *International Journal of Machine Learning and Cybernetics*, vol. 10, no. 12, pp. 3407-3416, 2019.

Z. Hanifelu, P. Adibi, S. A. Monadjemi, and H. Karshenas, "KNN-based multi-label twin support vector machine with priority of labels," *Neurocomputing*, vol. 322, pp. 177-186, 2018.

N. Noormohamadi, P. Adibi, S. M. S. Ehsani, "Semantic image segmentation using an improved hierarchical graphical model," *IET Image Processing*, vol. 12, no. 11, pp. 1943-1950, 2018.

S. Amraee, A. Vafaei, K. Jamshidi, P. Adibi, "Abnormal event detection in crowded scenes using one-class SVM," *Signal, Image and Video Processing*, vol. 12, no. 6, pp. 1115-1123, 2018..

M. S. Mahdavinejad, M. Rezvan, M. Barekatain, P. Adibi, P. Barnaghi, A. P. Sheth, "Machine learning for Internet of Things data analysis: A survey," *Digital Communications and Networks*, vol. 4, no. 3, pp. 161-175, 2018.

S. Amraee, A. Vafaei, K. Jamshidi, P. Adibi, "Anomaly detection and localization in crowded scenes using connected component analysis," *Multimedia Tools and Applications*, vol. 77, no. 12, pp. 14767-14782.

A. Sokhandan, P. Adibi, and M. Sajadi, "Multitask fuzzy Bregman co-clustering approach for clustering data with multisource features," *Neurocomputing*, vol. 247, pp. 102-114, 2017.

S. Ahmadkhani and P. Adibi, "Face recognition using supervised probabilistic principal component analysis mixture model in dimensionality reduction without loss framework," *IET Computer Vision*, vol. 10, no. 3, pp. 193-201, 2016.

A. Nazarpour and P. Adibi, "Two-stage multiple kernel learning for supervised dimensionality reduction," *Pattern Recognition*, vol. 48, no. 5, pp. 1854–1862, 2015.

P. Adibi, "A growing hierarchical approach to batch linear manifold topographic map formation," *Journal of Computing and Security*, vol. 1, no. 1, pp. 47-59, 2014.

P. Adibi and R. Safabakhsh, "Linear manifold topographic map formation based on an energy function with on-line adaptation rules," *Neurocomputing*, vol. 72, no. 7-9, pp. 1377-2064, 2009.

P. Adibi and R. Safabakhsh, "Information maximization in a linear manifold topographic map," *Neural Processing Letters*, vol. 22, no. 3, pp. 155-178, 2009.

P. Adibi, M.R. Meybodi, and R. Safabakhsh, "Unsupervised learning of synaptic delays based on learning automata in an RBF-like network of spiking neurons for data clustering," *Neurocomputing*, vol. 64, pp. 335-357, 2005.

R. Safabakhsh and P. Adibi, "Nastaaligh handwritten word recognition using a continuous-density variable-duration HMM", *Arabian Journal for Science and Engineering*, vol. 30. no. 1B, pp. 95-118, 2005.

Conference papers

F. Fathinezhad, P. Adibi, B. Shoushtarian, and J. Chanussot, "Graph Neural Networks and Reinforcement Learning: A Survey," Deep Learning and Reinforcement Learning, *IntechOpen*, 2023.

E. Hatefi, H. Karshenas, and P. Adibi, "Subspace Learning Augmented with Class Conditional Probability Estimation Based on SVM Classifier in Domain Adaptation," in

Proceedings of 25th National CSI Computer Conference, CSICC-2020, Iran University of Science and Technology, January 2020.

M. Behmanesh and P. Adibi, "Geometric Learning of Multimodal Data for Semi-supervised Domain Adaptation for Simultaneous Diagonalization of Laplacianes," in *Proceedings of 24th National CSI Computer Conference*, CSICC-2019, Sharif University of Technology, Tehran, Iran, February 2019 (in Persian).

M. Kiani and P. Adibi, "Online Multiple Object Tracking Using Extended Appearance Model Based on LBP Features and Tracklet Confidences," in *Proceedings of 3rd International Conference on Pattern Recognition and Image Analysis*, IPRIA-2019, Shahrekord University, Shahrekord, Iran, April 2017 (in Persian).

N. Noormohammadi, P. Adibi, and S. M. S. Ehsani, "Semantic image segmentation using an improved hierarchical graphical model," in *Proceedings of 21st Annual CSI Computer Conference*, CSICC-2016, School of Computer Science, IPM, Tehran, Iran, March 2016 (*in Persian*).

N. Bakhshandeh-Bavarsad and P. Adibi, "Combining large margin nearest neighbor classifiers within the framework of Dempster–Shafer theory," in *Proceedings of 21st Annual CSI Computer Conference*, CSICC-2016, School of Computer Science, IPM, Tehran, Iran, March 2016 (*in Persian*).

S. Esteki and P. Adibi, "Estimating the number of clusters using Dirichlet process mixture model by considering a distribution for the concentration parameter," in *Proceedings of 21st Annual CSI Computer Conference*, CSICC-2016, School of Computer Science, IPM, Tehran, Iran, March 2016 (*in Persian*).

M. Jafaei and P. Adibi, "Tuning the AdaBoost classifiers weights based on temporary changes in the location of difficult samples," in *Proceedings of 20th Annual CSI Computer Conference*, CSICC-2015, Ferdowsi University of Mashhad, Mashhad, Iran, March 2015 (*in Persian*).

E. Shabaninia and P. Adibi, "Using extended histograms for multi-view human recognition," in *Proceedings of 20th Annual CSI Computer Conference*, CSICC-2015, Ferdowsi University of Mashhad, Mashhad, Iran, March 2015 (*in Persian*).

P. Ostovari and P. Adibi, "Comparison of data clustering with Bregman divergence and total Bregman divergence," in *Proceedings of 20th Annual CSI Computer Conference*, CSICC-2015, Ferdowsi University of Mashhad, Mashhad, Iran, March 2015 (*in Persian*).

N. Imanpour, P. Adibi, and M. T. Manzuri-Shalmani, "Pose variant face recognition with a single training sample using curvelet features and tied factor analysis," in *Proceedings of 20th Annual CSI Computer Conference*, CSICC-2015, Ferdowsi University of Mashhad, Mashhad, Iran, March 2015 (*in Persian*).

M. H. Edrisi, H. Mahvash-Mohammadi, and P. Adibi, "Automatic facial age estimation based on learning from label distributions using neural networks," in *Proceedings of 20th Annual CSI Computer Conference*, CSICC-2015, Ferdowsi University of Mashhad, Mashhad, Iran, March 2015 (*in Persian*).

Z. Assarzadeh and P. Adibi, "A weighted naïve Bayes classifier based on harmony search algorithm," in *Proceedings of 22nd Iranian Conference on Electrical Engineering*, ICEE-2014, Shahid Beheshti University, Tehran, Iran, May 2014 (*in Persian*).

Z. Assarzadeh and P. Adibi, "A new feature selection technic based on binary harmony search algorithm for naïve Bayes classifier," in *Proceedings of 19th Annual CSI Computer Conference*, CSICC-2014, Shahid Beheshti University, Tehran, Iran, March 2014 (*in Persian*).

A. Nazarpour and P. Adibi, "Handwritten digit recognition using multiple kernel learning closed-form dimensionality reduction method," in *Proceedings of 19th Annual CSI Computer Conference*, CSICC-2014, Shahid Beheshti University, Tehran, Iran, March 2014 (*in Persian*).

A. Nazarpour and P. Adibi, "Study of the type and parameters of kernel function in kernel discriminant analysis method," in *Proceedings of 19th Annual CSI Computer Conference*, CSICC-2014, Shahid Beheshti University, Tehran, Iran, March 2014 (*in Persian*).

P. Adibi, "Local dimensionality reduction using linear manifold topographic map with growing hierarchical structure," in *Proceedings of 21st Iranian Conference on Electrical Engineering*, ICEE-2013, Ferdowsi University of Mashhad, Mashhad, Iran, May 2013 (*in Persian*).

M. S. Panahandeh, P. Adibi, and F. Shafizadegan, "Hand detection using multiplicative kernels based detectors," in *Proceedings of 21st Iranian Conference on Electrical Engineering*, ICEE-2013, Ferdowsi University of Mashhad, Mashhad, Iran, May 2013 (*in Persian*).

A. Nazarpour, P. Adibi, and H. Ebrahimpour, "Kernel discriminant analysis with optimal parameters for recognition of Iranian Banknotes," in *Proceedings of 21st Iranian Conference on Electrical Engineering*, ICEE-2013, Ferdowsi University of Mashhad, Mashhad, Iran, May 2013 (*in Persian*).

M. S. Panahandeh, P. Adibi, and F. Shafizadegan, "Training a family of SVM based detectors with combined kernels for detection and pose estimation of hand in the sign language images," in *Proceedings of 5th International Conference on Information and Knowledge Technology*, IKT-2013, University of Shiraz, Shiraz, Iran, May 2013 (*in Persian*).

F. Shafizadegan, P. Adibi, and, M. S. Panahandeh "Pose invariant face detection in images using combined kernels based models," in *Proceedings of 11th Iranian Conference on*

Intelligent Systems, ICIS-2013, Kharazmi University, Tehran, February 2013 (*in Persian*).

Z. Assarzadeh and P. Adibi, "Improved discrete binary harmony search algorithm for fuzzy classifier design," in *Proceedings of 11th Iranian Conference on Intelligent Systems*, ICIS-2013, Kharazmi University, Tehran, February 2013.

S. M. Pesteie, P. Adibi, and S. A. Monadjemi, "Bayesian texture classification using features extracted from Hadamard transform and Gabor filters," in *Proceedings of 17th Annual CSI Computer Conference*, CSICC-2012, Sharif University of Technology, Tehran, Iran, March 2012 (*in Persian*).

P. Adibi and R. Safabakhsh, "Batch regional linear manifold topographic map with adaptable extents for handwritten digit recognition," in *Proceedings of 19th Iranian Conference on Electrical Engineering*, ICEE-2011, Amirkabir University of Technology, Tehran, Iran, May 2011 (*in Persian*).

P. Adibi and R. Safabakhsh, "Batch linear manifold topographic map with regional dimensionality estimation," in *Proceedings of the International Joint Conference on Neural Networks*, IJCNN-2009, Atlanta, Georgia, pp. 63-70, 2009.

P. Adibi and R. Safabakhsh, "Batch linear manifold topographic map with explicit data visualization capability," in *Proceedings of 14th Annual CSI Computer Conference*, CSICC-2009, Amirkabir University of Technology, Tehran, Iran, October 2009 (*in Persian*).

P. Adibi and R. Safabakhsh, "Joint entropy maximization in the kernel-based linear manifold topographic map," in *Proceedings of the International Joint Conference on Neural Networks*, IJCNN-2007, Orlando, Florida, pp. 1133-1138, 2007.

P. Adibi and R. Safabakhsh, "Learning subspaces based on joint entropy maximization in an adaptive self-organizing map," in *Proceedings of 14th Iranian Conference on Electrical Engineering*, ICEE-2006, Amirkabir University of Technology, Tehran, Iran, May 2006 (*in Persian*).

P. Adibi and R. Safabakhsh, "Analysis of the cluster shape defined by a leaky integrate and fire spiking neuron in low dimensional input spaces," in *Proceedings of 11th Annual CSI Computer Conference*, CSICC-2006, School of Computer Science, IPM, Tehran, Iran, January 2006 (*in Persian*).

S. Khorsandi and P. Adibi, "Improved efficient loss rate estimation under heavy-tail traffic based on a global burst multiplier factor," in *Proceedings of 2004 International Symposium on Performance Evaluation of Computer and Telecommunication Systems*, SPECTS-2004, San Jose, California, 2004.

S. M. Tashakori-Hashemi, P. Adibi, A. Jahanian, and A. Nourollah, "Solving dynamic Steiner tree problem using ant colony system," in *Proceedings of 9th Annual CSI Computer Conference*, CSICC-2004, Sharif University of Technology, Tehran, Iran, February 2004 (*in Persian*).

P. Adibi, M.R. Meybodi, and R. Safabakhsh, "Unsupervised learning of synaptic delays based on learning automata in an RBF-like network of spiking neurons," in *Proceedings of 9th Annual CSI Computer Conference*, CSICC-2004, Sharif University of Technology, Tehran, Iran, February 2004 (*in Persian*).

R. Safabakhsh and P. Adibi, "Two enhanced methods for segmentation of Farsi Nastaaligh handwritten words," in *Proceedings of 10th Iranian Conference on Electrical Engineering*, ICEE-2002, University of Tabriz, Tabriz, Iran, May 2002 (*in Persian*).

R. Safabakhsh and P. Adibi, "Off-line handwritten Farsi nastaaligh word recognition using a continuous-density variable-duration hidden Markov model," in *Proceedings of 7th Annual CSI Computer Conference*, CSICC-2002, Iran Telecommunication Research Center, Tehran, Iran, March 2002 (*in Persian*).