

# Hossein Hajimirsadeghi

[linkedin.com/in/hajimirsadeghi](https://www.linkedin.com/in/hajimirsadeghi)

Borealis AI  
Vancouver, BC, Canada  
☎ +1 (778) 707 0704  
✉ [hossein.hajimirsadeghi@gmail.com](mailto:hossein.hajimirsadeghi@gmail.com)  
📄 [hossein-h.github.io](https://github.com/hossein-h)

## Education

- 2011–2015 **Ph.D., Computing Science**, Simon Fraser University (SFU), Canada.
  - **Thesis:** Multiple Instance Learning for Visual Recognition. **Supervisor: Dr. Greg Mori.**
- 2008–2010 **M.Sc., Electrical and Computer Engineering**, University of Tehran, Iran.
  - **Thesis:** Conceptual Imitation Learning Based on Perceptual and Functional Characteristics of Action.
- 2004–2008 **B.Sc., Electrical and Computer Engineering**, University of Tehran, Iran.
  - **BS Project:** Nash Equilibrium Search for Nonlinear Games, Using Evolutionary Algorithms.

## Skills

- Machine Learning:** 11 years of experience and more than 15 publications in Kernel Learning, Multi-Instance & Structured Learning, Neural Networks, Boosting, Representation Learning, Generative Models.
- Deep Learning:** 5 years of experience and worked on supervised and unsupervised problems with different applications (e.g., computer vision, anomaly detection, tabular data analysis, representation learning, data imputation, relational learning, graph learning, time-series prediction). Worked with different platforms such as Pytorch, Keras, and TensorFlow.
- Computer Vision:** 4 years of experience and more than 5 publications in Image/Video Classification, Video Event Detection, Video Summarization, Human Activity Recognition.
- Intrusion detection:** 3 years of experience in network data and log data analysis for security applications.
  - Optimization:** Convex Optimization, Evolutionary Optimization, Multi-objective Optimization.
  - Robotics:** Robot Programming by Demonstration (a.k.a. Imitation Learning), Robot Motion Pattern Learning and Control, Computational Perception and Action, Human-Robot Interaction.
- Natural Language Processing:** Information Extraction, Keyword Extraction, Python Natural Language Tool Kit (NLTK).
- Market Analysis:** Electricity Markets, Equilibrium in Games, Pareto Improvement Models, Time Series Prediction.
- Control Systems:** Optimal Control, Intelligent Control, Fuzzy Systems, Cooperative Control.
- Programming:** PYTHON (advanced), MATLAB (advanced), JAVA (solid), C++ (prior experience).

## Technical Work Experience

- 2018-present **Senior Machine Learning Researcher**, *Borealis AI*, Vancouver, Canada.  
Machine learning research on financial data analysis and credit strategies, including representaiton learning, data imputation, relational learning, spatiotemporal prediction.
- 2018 **Principal Member of Technical Staff**, *Oarcle Labs*, Vancouver, Canada.  
Deep learning research on intrusion detection, network data and log data analysis.
- 2016-2017 **Senior Member of Technical Staff**, *Oarcle Labs*, Vancouver, Canada.
- 2014–2015 **Research Engineer – Part Time Consultant**, *BroadBandTV Corp.*, Vancouver, Canada.  
Textual information extraction.
- Summer 2014 **Research and Development Intern**, *BroadBandTV Corp.*, Vancouver, Canada.
  - Developed a keyword extraction system for English, Spanish, French, Portuguese, Dutch, and German.

## Academic Research Experience

- 2011-2015 **Research Assistant/PhD Student**, *Simon Fraser University*, Burnaby, Canada.

**Multiple Instance Learning – MIL**, (Published 4 papers).

- Designed a novel and general framework for multiple instance learning.
- Applied the proposed methods to video event detection, video summarization, image categorization, cyclist's helmet recognition, and human activity recognition from videos captured by street cameras.

**TRECVID Multimedia Event Detection evaluation**, (Co-authored one paper and two technical reports).

- Developed a system based on computer vision and machine learning to retrieve videos of interest from more than 100K videos of TRECVID, sponsored by the National Institute of Standards and Technology.
- Collaborated with Genie team made up of research groups in Stanford University, Georgia Institute of Technology, SUNY-Buffalo and Honeywell led by Kitware Inc.

**Learning Latent Structured Models**, (Published one paper).

Designed a novel algorithm to learn high-capacity latent structured models based on Gradient Boosting.

2009–2010 **MS Thesis, *Conceptual Imitation Learning***, University of Tehran, Tehran, Iran, (Published 4 papers).

- Designed a bio-inspired conceptual model for robot programming by imitation and reinforcement to learn high-level concepts (e.g., social skills) based on perceptual or functional effects of actions.
- Developed a robotic system on the Aldebaran Robotics<sup>®</sup> Nao humanoid robot.
- Proposed an interactive reinforcement-based algorithm to incrementally learn, abstract, and generalize spatio-temporal demonstrations of the teacher in the robot's associative memory.
- Fusion of different modalities, including vision, motor, and audition in order to make the robot learn and associate different perceptual representations of an action.
- Learning emotional concepts based on the effects of robot's actions on a human facial expression.

2008–2010 **BS project, *Analysis of Electricity Markets, Using Computational Intelligence and Game Theory***, University of Tehran, Tehran, Iran, (Published 2 papers).

- Proposed novel algorithms to find Nash equilibrium in games with non-linear profit or demand functions.
- Proposed a multi-objective evolutionary algorithm to study the Pareto improvement model in an oligopolistic electricity market of nonlinear demand.
- Analyzed the IEEE 30-bus system with stochastic cost data in a risk management problem.

2008–2010 **Part of the BS project, *Bio-inspired Optimization for Intelligent Control and Decision Making***, University of Tehran, Tehran, Iran, (Published 4 papers).

- Applied bio-inspired optimization in adaptive control of a surge tank.
- Applied bio-inspired optimization for cooperative multi-task assignment of drones.
- Designed novel extensions of Invasive Weed Optimization (IWO) such as IWO/PSO, discrete IWO, co-evolutionary IWO, and multi-objective IWO.

2007–2008 **Research Externship, RAISE Institute**, University of Tehran, Iran.

Research on models of household electricity consumers' behaviour.

2005–2006 **R&D Intern, E-health dept. at Telecommunication Research Center**, Tehran, Iran.

Computational Intelligence for optimization of intensity modulated radio therapy (IMRT).

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## Other Experience

2011–2016 **Peer Reviewer**.

T-PAMI 2016, BMVC 2015, CVPR 2015, ACCV 2014, ICCV 2013, BMVC 2013, ACCV 2011.

2014 **Volunteer Math Tutor**, *National Education College*, Vancouver, Canada.

2012–2013 **Teaching Assistant**, *Simon Fraser University*, Burnaby, Canada.

- **Data Structures and Programming** (Spring 2012 and Spring 2013).
- **Introduction to Computing Science** (Spring 2013).

2009–2010 **Lecturer, IEEE Student Branch at University of Tehran**, Tehran, Iran.

- **Introduction to programming in MATLAB**.

2006–2009 **Teaching Assistant, University of Tehran**, Tehran, Iran.

- **Optimal Control** (Spring 2009).
- **Signals and Systems** (2007).
- **Engineering Mathematics** (2006).

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## Selected Publications

Full list of publications is at <http://hossein-h.github.io/> and my [google scholar page](#)

- 2020 **H. Hajimirsadeghi** et al., "Context-aware feature embedding and anomaly detection of sequential log data using deep recurrent neural networks," U.S. Patent Application No. 16/122,505. 2020.
- 2019 S. Su, **H. Hajimirsadeghi**, and G. Mori, "Graph Generation with Variational Recurrent Neural Network," Workshop on Graph Representation Learning (at NeurIPS), 2019.
- 2016 **H. Hajimirsadeghi** and G. Mori, "Multi-Instance Classification by Max-Margin Training of Cardinality-Based Markov Networks," IEEE Transactions on Pattern Analysis and Machine Intelligence (**TPAMI**), 2016.
- 2015 **H. Hajimirsadeghi** and G. Mori, "Learning Ensemble Latent Structured Models in Functional Space by Gradient Boosting," IEEE International Conference on Computer Vision (**ICCV**), Dec 2015.
- 2015 **H. Hajimirsadeghi**, W. Yan, A. Vahdat, and G. Mori, "Visual Recognition by Counting Instances: A Multi-Instance Cardinality Potential Kernel," IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), June 2015.
- 2013 **H. Hajimirsadeghi**, J. Li, G. Mori, M. Zaki, and T. Sayed, "Multiple Instance Learning by Discriminative Training of Markov Networks," Proc. 29th Conference on Uncertainty in Artificial Intelligence (**UAI**), pp. 262–271, July 2013.
- 2013 **H. Hajimirsadeghi**, M. Nili Ahmadabadi, and B. Nadjar Araabi, "Conceptual imitation Learning based on perceptual and functional characteristics of action," IEEE Transactions on Autonomous Mental Development (**TAMD**), vol. 5, no. 4, pp. 311–325, 2013.
- 2012 **H. Hajimirsadeghi** and G. Mori, "Multiple Instance Real Boosting with Aggregation Functions," Proc. 21st IAPR International Conference on Pattern Recognition (**ICPR**), Tsukuba Science City, Japan, pp. 2706–2710, Nov. 2012.
- 2012 **H. Hajimirsadeghi**, M. Nili Ahmadabadi, B. Nadjar Araabi, H. Moradi, "Conceptual imitation learning in a human-robot interaction paradigm," ACM Transactions on Intelligent Systems and Technology (**TIST**), vol. 3, no. 2, 2012.
- 2012 A. Nikoofard, **H. Hajimirsadeghi**, A. Rahimi-Kian, C. Lucas, "Multi-objective Invasive Weed Optimization: Application to Analysis of Pareto Improvement Models in Electricity Markets," Applied Soft Computing, vol. 12, no. 1, pp. 100–112, 2012.
- 2010 **H. Hajimirsadeghi**, M. Nili Ahmadabadi, M. Ajallooeian, B. Nadjar Araabi, H. Moradi, "Conceptual Imitation Learning: Application to Human-Robot Interaction," Journal of Machine Learning Research: Workshop and Conference Proceedings (**ACML**), vol. 13, pp. 341–356, 2010
- 2009 **H. Hajimirsadeghi**, C. Lucas, "A hybrid IWO/PSO algorithm for fast and global optimization," Proc. EUROCON 2009 (Finalist in IEEE R8 student paper contest 2009).

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## Honors and Awards

- 2013–2015 Simon Fraser University Graduate Fellowship.
- 2013–2015 Ebco/Eppich Graduate Scholarships in Intelligent Systems.
- 2014 Simon Fraser University President's PhD Scholarship.
- 2011 Finalist in [IEEE R8 Student Paper Contest 2011](#).
- 2010 3rd GPA among all Masters students of Electrical Engineering at University of Tehran.
- 2010 1st and 2nd place in the local student paper contest among ECE graduate students at University of Tehran.
- 2009 2nd place in the local student paper contest among ECE graduate students at University of Tehran.
- 2009 Finalist in [IEEE R8 Student Paper Contest 2009](#).