Mehdi Korjani

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Summary

Senior Associate, Data and Analytics, at KPMG with Ph.D. in Electrical Engineer from University of Southern California, minor in computer science and two master degrees in signal processing and control engineering; solid background in Machine Learning, Signal Processing, Optimization, and Control

Research Interest

General Topic of Interest

- Machine Learning, Deep Learning, Natural Language Processing, Chatbot, Fuzzy Logic, Data Mining, Signal Processing, Optimization, Control and Estimation

Specific Research Topics of Interest

- My work contributes directly in machine learning that lends itself to a variety of applications, including natural language processing, audio/text processing, oil industry, social science, medical, etc.

Education

University of Southern California — **Los Angeles, CA**
Post-doctoral researcher — 2015 – 2016

University of Southern California — **Los Angeles, CA**
Doctor of Philosophy, Department of Electrical Engineering — 2010 – 2015

University of Southern California — **Los Angeles, CA**
Master of Science, Electrical Engineering — 2010 – 2014

Amirkabir University of Technology — **Tehran, Iran**
Master of Science, Electrical Engineering — 2006 – 2009

Amirkabir University of Technology — **Tehran, Iran**
Bachelor's degree, Electrical Engineering — 2002 – 2006

NSF Proposal

National Science Foundation (NSF), I-Coprs Program — **Los Angeles, CA**
Co-Principal Investigator — Jan. 2016- Aug. 2016

- Led proposal efforts as co-PI to National Science Foundation, funded for 50k by NSF I-Corps
- Won Best Team Award, NSF I-Corps program, Georgia Institute of Technology Cohort
- Developed business plans for commercialization of technologies through customer discovery

Experience

Academic Experience

University of Southern California, Joint program with Chevron Inc. **Los Angeles, CA**
Post-doctoral Scholar Aug. 2015-May 2016

- **Develop Deep Learning Neural Network with Uncertain Variables for Reservoir Characterizations, Prediction and Fault Detection**: integrating uncertainties associated with variables into deep learning algorithms using fuzzy sets; Generate a 3D earth model and estimate reservoir properties at any point in the field; Results have been deployed in Chevron IAM department; published results in two peer review conference papers
- **Develop a Novel Parametric Nonlinear Regression Method for Forecasting Non-convex Functions**; simultaneously determines the exact mathematical structure of non-linear regressors and how many regressors there are; Patented by CiSoft center for fracture optimization and predict oil production

University of Southern California, Cisoft Lab **Los Angeles, CA**
Research Assistant Jan. 2010-Aug. 2015

- **Adaptive Linguistic Summarization of Field Models for Integrated Asset Management, Funded $264,159 by Chevron Energy Technology Company.** (January 2010 – December 2013): Generate summary of data using computing with words techniques for knowledge discovery and decision making, and mathematically describe fuzzy set Qualitative Comparative Analysis and apply it to Integrated Asset Management problems; Modeling databases and generating patterns from data; published results in 3 peer-review journal papers and 4 peer-review IEEE conference papers (**Won Best Paper award**)
- **Develop Nonlinear Regression Algorithm based on Combinations of Variables From Small to Big Data for Use in Later Processing** (January 2014 – December 2014): Establishing causal combination of variables caused the output; transform preprocessing into distributed and parallel processing which makes it suitable for big data analysis; Results has been published in one peer review journal papers.
- **Decision System for Liquid Lift Optimization Using Continuous Flowback Pressure, Funded $188,000 by Chevron's Upstream Workflow Transformation at SJV Business Unit**. (January 2015 – September 2015): Development and deployment of Choke decision-making algorithm based on historical data to increase production for unconventional reservoirs: Results have been deployed in Chevron IAM department.
- **Develop a Perceptual Computer for Logical Inference** (September 2013 – December 2013): Developed a ranking system based on natural language words for aiding people in making subjective judgments, based on perceptual computing (Per-C), published the results in a peer-review conference paper

Industry Experience

KPMG, Natural Language Processing, Lighthouse **Irvine, CA**
Senior Associate July 2017-Present

- Developed machine learning algorithm to extract protected health information PHI from medical records using OCR and NLP.
- Develop Chatbot for sales representative to present information about investment advisors using NLP and deep learning.
- Developed time series modeling to forecast ambulance demands in Victoria, Australia considering historical events, population, air pollution, weather and traffic data using deep learning algorithm

Oben Artificial Intelligence, Machine Learning Group **Pasadena, CA**
Research Scientist May 2016-July 2017

- Developed lyric generation model using deep learning algorithm (attention based LSTM seq2seq modeling) to generate new lyrics based on new topics using more than +20M lyrics words.
- Developed personalized chatbot based on backstory of a celebrity using deep learning algorithm, NLTK, and natural machine translation.
- Speech enhancement and voice activity detection using deep Learning algorithms to remove background noise from speech data, patented on Feb 2017.
- Speaker verification and identification using machine learning algorithms to determine speaker identify, patented on Sep. 2016

Lamsaptic Inc., **Los Angeles, CA**
Co-Principal Investigator Jan. 2015 – May 2016

- Develop algorithms for creating sense of touch, over the air, using high frequency ultrasound transducers
- Won NSF I-Corps grant for commercialization and customer discovery
- Won best team award in business plan development and commercialization

Medtronic Inc., **Northridge, CA**
Research Scientist, Intern May 2014- Aug. 2014

- Developed a new algorithm for modeling Continuous Glucose Monitoring (CGM) using the Unscented Kalman filtering in sensor research and development team, algorithm has been patented on Dec. 2015
- Analyzed and quantified large amounts of data of blood glucose to Interpret results to aid product development, decisions and designs

Amada Miyachi **Monrovia, CA**
Software Engineer, Intern May 2013- Aug. 2013

- Feature extraction and selection for classification of Resistance welding quality and forecasting weld quality

AUT Robotic Center **Tehran, Iran**
Software Engineer Jun. 2003- Feb. 2009

- Applied data mining algorithms and developed software for real-time prediction of location of robots
- Implemented machine learning methods for multi-agent decision making and path planning algorithms (won small size soccer league in Japan and China 2008)

Publications

Ph.D. Dissertation

1- **M. M. Korjani**, Intelligent Knowledge Acquisition Systems: From Descriptive to Predictive Models, University of Southern California, 2015.

Peer-Review Journal Papers

2- J. M. Mendel, **M. M. Korjani**, "On the Importance to fsQCA of the S-Shaped Membership Function and its Relation to and a Resolution of Lakoff's Criticism of fsQCA," under minor

revision, Information Sciences, 2018.

3- **M. M. Korjani**, A. Popa, E. Grijalva, S. Cassidy, I. Ershaghi, "*Reservoir Characterization using Fuzzy Kriging and Deep Learning Neural Networks*," submitted to SPE journal paper, 2017.
4- J. M. Mendel, **M. M. Korjani**, "*On Establishing Nonlinear Combinations of Variables from Small to Big Data for Use in Later Processing,*" Information Sciences, 2015.
5- J. M. Mendel, **M. M. Korjani**, "*Theoretical Aspects of Fuzzy Set Qualitative Comparative Analysis (fsQCA)," Journal of Information Sciences*, March, 2013.
6- J. M. Mendel, **M. M. Korjani**, "*Charles Ragin's Fuzzy Set Qualitative Comparative Analysis (fsQCA) Used for Linguistic Summarizations*," Journal of Information Sciences, October, 2012.
7- **M. M. Korjani**, O. Bazaz, M. B. Menhaj, "*Real Time Identification and Control of Dynamic Systems Using Recurrent Neural Networks,*" Journal of Artificial Intelligence Review, December 2008.

Peer-Review Conference Papers

8- A. Bakshi, E. Uniacke, **M. M. Korjani**, I. Ershaghi, "*A Novel Adaptive Non-Linear Regression Method to Predict Shale Oil Well Performance Based on Well Completions and Fracturing Data*," WRM, SPE 185695, 2017.
9- **M. M. Korjani**, A. Popa, E. Grijalva, S. Cassidy, I. Ershaghi, "*Reservoir Characterization using Fuzzy Kriging and Deep Learning Neural Networks*," ATCE, SPE 181578, 2016.
10- **M. M. Korjani**, A. Popa, E. Grijalva, S. Cassidy, and I. Ershaghi, "*A New Approach to Reservoir Characterization Using Deep Learning Neural Networks*," Society of Petroleum Engineers, WRM meeting, doi:10.2118/180359- MS, 2016.
11- **M. M. Korjani**, M. M., J. M. Mendel, and I. Ershaghi, "*A Predictive Model for Improving the Efficiency of Frac Jobs*," Society of Petroleum Engineers, doi:10.2118/174058-MS, 2015.
12- **M. M. Korjani**, J. M. Mendel, "Interval Type-2 Fuzzy Set Qualitative Comparative Analysis (IT2-fsQCA)," IEEE, NAFIPS, 2014.
13- **M. M. Korjani**, J. M. Mendel, "Non-linear Variable Structure Regression (VSR) and its Application in Time-Series Forecasting," IEEE, International Conference on Fuzzy Systems, 2014.
14- **M. M. Korjani**, J. M. Mendel, "Fuzzy Set Qualitative Comparative Analysis (fsQCA): Challenges and Applications," IEEE, NAFIPS August 6, 2012 **(Won Best Paper Award)**
15- **M. M. Korjani**, J. M. Mendel, "Fuzzy Love Selection by Means of Perceptual Computing," IEEE, IFSA June 2013.
16- **M. M. Korjani**, J. M. Mendel, "Validation of Fuzzy Set Qualitative Comparative Analysis (fsQCA): Granular Description of a Function," IEEE, NAFIPS August 6, 2012.
17- **M. M. Korjani**, J. M. Mendel, "Fast Fuzzy Set Qualitative Comparative Analysis (Fast fsQCA)," IEEE, NAFIPS August 6, 2012.
18- **M. M. Korjani**, M. Nourozi Talab, M. b. Menhaj, A. Afshar, "Dynamic Autonomous Agent Positioning Based on Computational Intelligence," IEEE, IMECS, 2009.
19- **M. M. Korjani**, A. Afshar, M. B. Menhaj, M. R. Rajati, "Optimal Model Detection in Distributed Sensor Networks Using Genetic-Fuzzy Clustering," IEEE, CEC September 25, 2007.
20- **M. M. Korjani**, M. R. Rajati, M. B. Menhaj, A. Dehestani, "Exponential Recurrent Associative Memories: Stability and Relative Capacity," IEEE ICTAI, November 2006.
21- M. Norouzitallab, **M. M. Korjani**, et al., "Nemesis 2D soccer simulation description," RoboCup 2009, Graz, Austria, 2009.
22- M. Norouzitallab, **M. M. Korjani**, et al., "Nemesis 2D soccer simulation description," RoboCup 2008, China, 2008.

Patents

23- **M. M. Korjani**, "*Deep learning speech enhancement model using dynamic noise profile estimation*," Application Number: 62461725, filed on Feb. 2017.
24- **M. M. Korjani**, "*Speaker Recognition Using Deep Learning*," Application Number: 62393597, filed on Sep. 2016.
25- A. Varsavsky, J. Mung, Y. Lu, and **M. M. Korjani**, "*Sensor-unspecific Calibration Methods and Systems*," U.S. Application No. 14/980,114, granted on Dec. 2015.
26- **M. M. Korjani**, J. Mendel, and F. Li, "*A Predictive Model of Tight Oil Reservoir*," U.S. patent application No. 70205.0493US01, granted on Dec. 2015.
27- **M. M. Korjani**, M. Milani, and A. Sarafi, "*Real Time Vehicle Tracking System Using Thuraya Satellite Network*," IR52906, Granted: Feb. 2009.

Technical Report

28- **M. M. Korjani** and J.M. Mendel, "*A New Methodology for Calibrating Fuzzy Sets in fsQCA Using Level 2 and Interval Type-2 Fuzzy Sets*," 2015.
29- **M. M. Korjani** and J.M. Mendel and M. Rodighiero, "*Fuzzy Rule Reduction Using Variable Linguistic Structure (VLS),*" 2014.

Teaching Experience

McMaster University, **Ontario, Canada**
Teaching Assistant: Control System Design Fall 2009

University of Birmingham joint program with Amirkabir University of Technology **Tehran, Iran**
Teaching Assistant, Robotic 2008-2009

Amirkabir University of Technology **Tehran, Iran**
Teaching Assistant: Instrumentation and Control Theory Spring 2009, Fall 2007
Instructor: Linear Control Lab 2007-2008
Teaching: Efficient Programming in MATLAB Fall 2006-2008
Industrial Control Fall 2007
Artificial Intelligence Fall 2006

Hatef High School **Tehran, Iran**
Physics Olympiad 2007
Mathematics Olympiad 2008

Student Advising

University of Southern California **Los Angeles, CA**
1- Master Student 2016
- Apply machine learning models to an MCBU data set for horizontal well completions
2- Master Student 2016
- Development of prediction models to increase oil production
3- Master Student 2016
- Developing descriptive algorithms to explore causes for high production wells
4- Master Student 2014
- Fuzzy Rule Reduction Using Variable Linguistic Structure (VLS)

Invited Talks and Conference Presentations

1- Chatbots, from NLP to deployment, Lighthouse presentation, KPMG, Orange County, January 2018.
2- Deep Learning algorithm, Natural Language Processing Academy, KPMG, Philadelphia, September 2017.
3- Reservoir Characterization using Fuzzy Kriging and Deep Learning Neural Networks," ATCE, SPE, Dubai, 2016.
4- Deep Learning: Challenges and Applications, Chevron Inc. Bakersfield, 2016.
5- A New Approach to Reservoir Characterization Using Deep Learning Neural Networks, SPE Western Regional Meeting, 2016.
6- From Descriptive to Predictive Models, Ming Hsieh Department of Electrical Engineering, 2014.
7- Fuzzy Set Qualitative Comparative Analysis (fsQCA): Challenges and Applications, North American Fuzzy Information Processing Society, 2013 (Won Best Paper Award).
8- Validation of Fuzzy Set Qualitative Comparative Analysis (fsQCA): Granular Description of a Function, North American Fuzzy Information Processing Society, 2012.

Honor and Awards

1- **Best Team Award**, NSF I-Corps program, Georgia Institute of Technology Cohort Mar. 2016
2- Selected as **a professional with exceptional ability** (National Interest Waiver) Mar. 2015
3- **First Place Winner** of The FRF's Second International Paper Competition Oct. 2012
4- **Best Paper Award**, NAFIPS Conference, Berkeley, Aug. 2012
5- Winner of the University's Chancellor Award Mar. 2009
6- Selected as an Honorary Position to enter MS Program without the National Exam Sep. 2006
7- Ranked 1st in International Kharazmi Competitions, Simulation design Nov.2008
8- Ranked 2nd in graduating class 2006, Amirkabir University of Technology Feb. 2009
9- Ranked 473th in National University Entrance Exam among +450,000 participants Sep. 2002

Professional Services

Journal Reviewer Services

1- IEEE Transactions on Fuzzy Systems
2- IEEE Transactions on Cybernetics
3- Journal of Intelligent and Fuzzy Systems
4- FUZZ-IEEE Conference

Technical and Personal Skills

- **Skills**: Deep learning, Machine learning, Natural Language Processing, Chatbot, Data Mining, Pattern Recognition, Neural Networks, Fuzzy Logic, Regression, Optimization, Signal Processing, Estimation Theory, Kalman Filter
- **Programming**: Python, MATLAB, SQL, C/C++
- **Machine learning Skills**: Keras, Theano, Tensorflow
- **Research Skills**: Highly motivated, Goal oriented, Work well in fast past environment, Independent research skills
- **Communication Skills**: Public speaking, Teaching, Academic paper writing and presentation