YOUSOF ERFANI

Citizenship ◇ Canadian Citizen
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PROFILE

I have several years of experience in digital signal processing and machine learning. I enjoy environments that provide me with challenging problems with data. I am interested in using new technologies such as natural language processing, deep learning, machine learning, Bayesian inference for financial/health data where I can perform applied research in parallel with development.

EDUCATION

Ph.D. Machine Learning and Signal Processing, University of Sherbrooke *2010-2016*
Computational Neuroscience Lab (NECOTIS)
Dissertation: Applications of bio-inspired perceptual sparse representation for audio watermarking

M.Sc. Digital Signal processing, Sharif University of Technology *2002-2004*
Thesis: Designing echo hiding methods for audio protection
Internship: ITRC, Tehran:
-Implementing Hidden Markov Model for Speaker recognition

B.Sc. Electrical Engineering, Sharif University of Technology *1998-2002*
Project title: A C++ implementation of Matched Filter for the radar receiver
Internship: Pars Electric Company, Tehran

WORK EXPERIENCE

CITIGROUP
July 2017 - Present
Data Science and Software Architect *Toronto, Canada*

· **Working with a team of data scientists and developers for designing data mining/analysis applications.**

• Extracting critical insights from traders chat logs using the NLP techniques for name entity recognition. Identifying the information about financial products from unstructured financial chats.

• Database design using KdB+ from unstructured data and automating the process using crontab in the linux environment via shell scripting

• Designed three classifiers based on machine learning, deep learning algorithms including random forest, gradient boosting and recurrent net. Our algorithm is able to correctly identify different products and pick up its related fields in with over 80% accuracy. Designed all the steps of the machine learning pipeline from gathering data. labeling to regression test

• Designing the new code base nlp engine from scratch, creating data pipeline, designing machine learning algorithms with data scientists, and leading the development process

· **Using recurrent neural network (LSTM) to model and predict from financial time series**

• Inspired by a research paper that showed positive results from using Support Vector Machine to predict equity price movements; I used LSTM(Long Short Term Memory) neural networks within Keras library to build the prototype. The results were promising, cross validation showed 60% accuracy.

· **Worked with a team of data scientist and traders to create a specialized word embedding used to model the traders jargon**

McMaster University 2016 - 2017
Research Scientist *Hamilton, Ontario*

- Improving statistical models for spike generation in auditory models (Languages: C, MATLAB (OCTAVE), Python)
- Applying different machine learning techniques in Kaggle Competitions (Languages: Python, Scikit Learn, TensorFlow (Convnet), Pandas, Keras, SQL)
- Using DNN models (RNN, LSTM) for NLP (Using TSNE visualization, word2Vec semantics model, dimensionality reduction using PCA)

University of Sherbrooke 2010 - 2015
Research Assistant *Sherbrooke, Quebec*

- Neural Decoding using Generalized linear-Bilinear Regression Models and Bayesian inference.
- Designing an efficient sparse based perceptual audio watermarking. Sparse representation is based on linear regression and L1 norm regularization.
- Speeding up the bio-inspired neural-network based sparse representation of the NECOTIS lab of the University of Sherbrooke by a factor of 5-10
- Emotion Recognition from Speech Using Support Vector Machine and Neural Network.
- Creating a new modulation technique for data embedding based on sparse representations of signals
- Optimizing PYTHON codes for overcomplete representation of images using Vector Quantization, Non Negative Matrix Factorisation and Fast Independent Component Analysis
- Designing an improved spread spectrum in the sparse domain for tamper localization in audio (speech)
- Designing new perceptual sparse attacks on audio watermarking methods.

ITRC 2008-2010
Researcher and Lecturer, machine learning and signal processing *Tehran*

- Designing an adaptive and content based time spread echo hiding algorithm for copyright protection.
- Developing a MATLAB code to apply and compare different adaptive filter types for noise and echo cancellation.
- Optimizing a Python code to apply Independent Component analysis for source separation
- Lecturing undergraduate level courses including signal processing (in C), machine learning (in Python) also numerical analysis (MATLAB).
- Speaker verification using GMM (in Python).

ITRC 2005-2008
Algorithm Engineer *Tehran*

- Designing three different adaptive and informed audio copyright methods based on single and double echo hiding.
- Acting as "internal Consultant" for a wide range of signal processing problems.
- Implementing audio -speech enhancement methods in the wavelet domain using the spectral subtraction method.
- Adapting the psychoacoustic model used in MP3 to shape the spread spectrum noise for audio watermarking

Electronics Research Center of Sharif University of Technology 2003-2005
Audio Software Engineer *Tehran*

- Improving the robustness of spread spectrum detector against malicious attacks based on a new three status decoder.

· Optimizing a fixed point C code for VOIP line echo cancellation using Adaptive Filter.
· Developing MATLAB codes for Digital Signature algorithms.
· Designing an application in C++ environment to attack classic cryptographic ciphers.

SKILLS

Expertise	Data Mining, Scikit-Learn, Machine Learning, Tensorflow, Keras, Pandas, Scipy (Numpy), Natural Language Processing, Algorithms,Python, Sparse representation, Matlab, Data Visualization, Bayesian statistics, Speech Enhancement, Data Analytics, Pattern Recognition, LaTeX, Audio and speech processing, Numerical Analysis, Adaptive Filtering, Linux (Ubuntu), Digital Signal Processing, Data Structures, Tortoise SVN, C(C++), Digital filters, ggplot, git.
Programming Languages	Python, C(C++), Matlab (Octave), SQL
CPU/Micro controller	MCS-51
Desktop Software	LaTex, Word, PowerPoint, Inkscape, Photoshop, SVN, Sharcnet cluster
OS	Windows, Linux(Ubuntu)
Languages	English(Fluent), French (Advanced)

OTHER PROFESSIONAL ACTIVITIES

Scientific journals and conferences

Journals

- Yousof Erfani, Shadi Siahpoush, Robust audio watermarking using improved TS echo hiding, Elsevier Digital Signal Processing journal, Vol(19), no(9), pp.809-814, 2009.
- Yousof Erfani, Ramin Pichevar, Jean Rouat, Audio watermarking using spikegram and a two-dictionary approach", IEEE Transactions on Information Forensics and Security,vol.12,no.4, pp.1556-6013, Dec 2016

Conferences

- Improving Neural Decoding in the Central Auditory System using Bio-Inspired Spectro-Temporal Representations and a Generalized Bilinear Model, IEEE EMBC 2015, Milan Italy
- Yousof Erfani, Ramin Pichevar, Jean Rouat, Audio tampering localization using modified ISS watermarking in sparse-domain, IEEE Global Conference on Signal and Information Processing (GlobalSIP), pp.249-252, Austin, 2013.
- Yousof Erfani, Mohammad Shahram Moin, Mehdi Parviz, New methods for transparent and accurate echo hiding by using the original audio cepstral content, IEEE ICIS International Conference on Computer and Information Science, pp.1087-1092, Melbourne, 2007.
- Yousof Erfani, Mehdi Parviz, Shirin Ghanbari, Improved time spread echo hiding method for robust and transparent audio watermarking, IEEE Signal Processing and Communications Applications, Eskisehir, Turkey, pp.1-4, 2007.
- Yousof erfani, Mohammad Adeli, A new embedding method for robust ISS watermarking, IEEE ICICS, Singapore, pp.1-5, 2007.

Reviewer

- IEEE Transaction on Audio Speech and Language processing, Elsevier journal on Digital Signal

Processing, IEEE GobalSIP Conference.

Professional Service Membership

ACM, IEEE, USherbrooke and Sharif university alumni association

Talks

- Neural Decoding of recording using Bayesian statistics, EMBC 2015, Milan, Italy, August 2015.
- Tampering localization using modified ISS watermarking in sparse-domain, Austin-Texas Convention center, December 2013.
- Denoising based on sparse representation and gammatone filter bank, presented at Sharif University of Technology, Tehran Iran, June 2012.
- Improving the speed of a bio-inspired neural network for sparse representation, presented at Universite de sherbrooke, April 2011.
- Inaudible noise shaping using human psychoacoustic model, presented in the faculty of science, University of Twente, Netherland, June 2009.
- New methods for transparent and accurate echo hiding by using the original audio cepstral content, presented at IEEE ICIS, July 2007, Melboune, Australia.
- Improved time spread echo hiding method presented at IEEE SIU 2007 Eskisehir, Turkey.
- A new data embedding method, presented at IEEE ICICS, Singapore, Dec 2007.

SCHOLARSHIPS AND AWARDS

- NSERC Doctoral Scholarship *2010-2014*
- Student Travel Award IEEE ICASP conference, Vancouver, Canada. *2013*
- International Graduate Student tuition fee exemption for outstanding students, University of Sherbrooke, Canada. *2010-2013*
- My second bourse institionelle Award, University of Sherbrooke, Quebec, Canada. *2013*
- University of Sherbrooke's Institutional Scholarship (Bourse institutionnelles) *2013*
- Travel Grant to attend a summer school on auditory cognition, Plymouth, UK, *2012*
- University of Sherbrooke, Graduate Student Travel Awards (declined), Canada. *2011*
- My first bourse institionelle Award, University of Sherbrooke, Quebec, Canada. *2011*
- Research Scholarship for outstanding instructors, Project: Multimedia security using watermarking techniques. *2008-2010*
- Award for outstanding instructor, Azad university of Dezfool. *2009*
- Research scholarship for outstanding instructors, Project: Implementing digital signatures (Public key cryptography) in C++, Azad university, Dezfool, Iran *2007-2008*
- Iran Telecomm Research Center (ITRC) scholarship award. *2003*
- Ranked 81 amongst the ~8500 participants in the Iran national University Entrance Exam for the MS.c. in Electrical Engineering. *2002*
- Ranked 4 amongst the ~12000 participants (of District 3) in the Iran national University Entrance Exam for BS.c studies. *1998*