Roberto Vega

Contact Information

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Highlights

- 8+ years of hands-on experience using machine learning (Deep learning, 'traditional' algorithms, probabilistic graphical models), with a focus on medical datasets. Most of my research is implemented in Python (Tensorflow, Sklearn) and Matlab.
- Developed the AI for the analysis of ultrasound images for clinical purposes, some of them are FDA approved..
- My research focuses on learning accurate prediction models with limited training instances, with training instances acquired under different conditions (different scanners, etc), and on the incorporation of domain specific knowledge to learning algorithms.

Education

Ph.D. Statistical Machine Learning Fall 2022 (Expected)
University of Alberta - Edmonton, Alberta, Canada Supervisor: Russ Greiner
Thesis: Machine learning for medical applications with limited data: Incorporating domain expertise and addressing domain-shift

M.Sc. Computing Science Dec 2016
University of Alberta - Edmonton, Alberta, Canada
Supervisor: Russ Greiner
Thesis: The challenge of applying machine learning techniques to diagnose schizophrenia using multi-site fMRI data. (https://goo.gl/qMH1Ic)

B.Sc. Mechatronics Engineering Dec 2008
ITESM - Guadalajara, Jalisco, Mexico

Research Experience

Alberta Machine Intelligence Institute, Graduate Student Sep 2014 - Current

- Development of sample efficient learning algorithms for segmentation and classification of medical images (CNN, multitask learning, probabilistic labels).
- Explored machine learning methodologies to combine data acquired with different scanners (Domain adaptation, GANs)
- Researched the use of probabilistic graphical models (HMM, Kalman Filters, Bayesian Nets, GMRF) and deep learning (CNN, RNN) for medical related tasks: EEG, fMRI, Ultrasound, COVID-19.

- Designed an ensemble of learning algorithms for prediction of treatment discontinuity on patients with prostate cancer (DREAM Challenge Competition).

ITESM, Research Assistant — Feb 2013 - Aug 2014

- Researched on the use of image processing and lattice neural networks for blood vessel segmentation in retinal images.
- Researched on the use of machine learning algorithms for classification tasks in data acquired with functional near-infrared spectroscopy.

Work Experience

AI Scientist - MedoAI — Nov 2018 - Present

- Developed machine learning models for segmentation and classification of medical ultrasound images.
- Developed classifiers for suggesting diagnosis based on ultrasound images (Patent pending).

Teaching Assistant - University of Alberta — Sep 2014 - Dec 2020

- Probabilistic Graphical Models (4 times, 2016 - 2020)
- Introduction to Machine Learning (4 times, 2015 - 2019).

Assistive Technology Engineer - CRIT Occidente — Sep 2011 - Feb 2013

- Designed and adapted assistive technology for people with severe physical disabilities.

Co-founder, Motion Mechanics — Apr 2009 - Dec 2011

- Founded a startup focused on the design and development of equipment for physical rehabilitation. (Patented a system for gait rehabilitation.)

Scholarships and Awards

- **CONACYT scholarship holder (MSc, PhD)**: Award given by the National Council of Science and Technology (Mexico). It covers 100% of the tuition cost for the MSc and PhD program and it provides a monthly stipend of $1,100 USD for living expenses. (Sept 2014 - Feb 2021)
- **University of Alberta Doctoral Recruitment Scholarship:** Award with a value of $10,000 CAD for the first year of the PhD program at the University of Alberta. (Jan 2017)
- **DREAM Challenge Competition: 1st place in sub-challenge 2**. Part of the team that won first place (tied with 5 other teams) in one of 3 sub-challenges in the Prostate Cancer DREAM Challenge. This challenge aimed to predict the survival and toxicity of docetaxel treatment in patients with metastatic castrate resistant prostate cancer. (August, 2015)

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Languages

English (Toefl IBT 108/120) Spanish (Native speaker) German (Basic)

Selected publications (Full list on Google scholar profile: http://goo.gl/rgS1o2)

- Roberto Vega, et al. *SIMLR: Machine learning inside the SIR model for COVID-19 Forecasting.* Forecasting, 4, 1. January, 2022. (https://www.mdpi.com/2571-9394/4/1/5)
- Roberto Vega, et al. *Sample Efficient Learning of Image-Based Diagnostic Classifiers Using Probabilistic Labels.* AISTATS, 2021 (https://bit.ly/2UGimfG)
- Roberto Vega, et al. *Retinal Vessel Extraction using Lattice Neural Networks with Dendritic Processing.* Computers in Biology and Medicine. Vol 58. pp 20 - 30. January, 2015 (goo.gl/cfX7q4)