David Rozado

Principal Lecturer

Otago Polytechnic

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https://drozado.github.io/

Research Interests

Machine Learning, Computational Content Analysis, Accessibility Software

Work Experience

Principal Lecturer

Otago Polytechnic

April 2015 - Present

- Lecturer of Machine Learning course
- Lecturer of Algorithms and Data Structures course
- (2015-2017) Lecturer of Web Programming course
- Supervisor of Bachelor Capstone projects
- Research on Accessibility Software and Machine Learning Driven Content Analysis
- Creation of Otago Polytechnic Open Source Accessibility Software Hub

Postdoctoral Fellow

CSIRO

January 2012 - April 2015

- Worked on pupilometry for assessment of cognitive load and motor imagery
- Worked on an EEG-based motor imagery Brain Computer Interface for rehabilitation of upper extremity
- Worked on eye tracking augmented HCI

Research and Teaching Graduate Assistant

Universidad Autonoma de Madrid

February 2007 - December 2011

- Worked on Hierarchical Temporal Memory (HTM), a bioinspired pattern recognition algorithm, and its applications to temporal time series such as gaze gestures recognition
- Involved in teaching cores in the courses: Introduction to Computer Science and Fundamentals of Informatics

Research Assistant

Max Planck Institute for Molecular Genetics

November 2003 - October 2005

- Software Development / Data Analysis

» Developed bioinformatics tools for selection of over 10,000 gene transcript representative clones for the EURexpress project

» Developed algorithm for computational prediction of Exon Splicing Enhancers in human genome

» Developed software for visualization of Chromosome 21 gene expression patterns in mouse embryos

Technical Skills

Python
R
Matlab
JavaScript
Node.js
C++
jQuery
Django
RESTful APIs
SQL
Apache Spark
TensorFlow
Pytorch
Keras
Scikit-learn
Scrapy
Gensim
Spacy
NLTK
IBM Watson Services
Transformers

Education

Ph.D in Computer Science

Universidad Autónoma de Madrid
August 2011

During my Ph.D I studied a connectionist machine learning algorithm known as Hierarchical Temporal Memory, or HTM. HTM is bioinspired on some of the working principles employed by the neocortex to create invariance, namely spatio-temporal coding and a hierarchical topology of learning units or nodes. Particularly, I explored the application of HTM algorithms to spatio-temporal patterns that unfold over time.

M.Sc. in Bioinformatics

Freie Universität Berlin
August 2005

During my Master Degree, I took classes in a wide array of areas: Numerical Computing, Biological Networks, Data Analysis, Signal Pathways, Cognitive Neuroscience, and Algorithms for Bioinformatics. I carried out my master's thesis on the selection of genetic sequences for the transcriptome-wide mapping project known as EURexpress at the Max Planck Institute for Molecular Genetics under the supervision of Prof. Dr. Hans Lehrach.

B.Sc. in Information Systems

Boston University
May 2002

I completed my undergraduate degree in Information Systems. The degree consisted of traditional Business and Information Systems Management courses such as: Database Administration and Design, Object Oriented Programming, C++ Programming, Network

Architectures and Systems Design. Due to my interest in Bioinformatics, I also got a Minor in molecular biology, by taking classes in: Molecular Biology, Genetics, Biochemistry, Organic Chemistry and Bioinformatics.

Graduate Diploma in Tertiary Education

Otago Polytechnic

November 2016

During my graduate diploma in tertiary education I learned to analyse and employ effective learning and teaching strategies using learner-centred practices informed by relevant educational theories and research. I practiced the design and delivery of an inclusive curriculum to address the diverse needs of learners within the cultural context in which I work. I also learned to construct and implement effective assessment practices and to employ reflective processes to improve practice and maintain professional currency while responding to relevant trends within the tertiary education context.

Publications

Wide range screening of algorithmic bias in word embedding models using large sentiment lexicons reveals underreported bias types

Rozado D (2020) *PLoS ONE 15(4): e0231189. https://doi.org/10.1371/journal.pone.0231189*

Prejudice and Victimization Themes in New York Times Discourse: a Chronological Analysis

D Rozado. *Academic Questions 33.1 (2020): 89-100.*

Using Word Embeddings to Analyze how Universities Conceptualize “Diversity” in their Online Institutional Presence

D Rozado. *Society 56.3 (2019): 256-266.*

Why Are Nondiscrimination Statements Not Diverse?

D Rozado, S Atkins. *Academic Questions, September 2018, Volume 31, Issue 3, pp 295–303*

Gaze Control Toolbar: A Low-Cost Software Solution for Gaze Based Computer Interaction

D Rozado. *International Conference on Computers Helping People with Special Needs, 407-414*

Otago polytechnic accessibility software hub: an open source repository of accessibility software for motor impairment

D Rozado, P Haden. *OZCHI '17 Proceedings of the 29th Australian Conference on Computer-Human Interaction Pages 428-432*

Fast Human-Computer Interaction by Combining Gaze Pointing and Face Gestures

D Rozado, J Niu, M Lochner. *ACM Transactions on Accessible Computing (TACCESS)*

Detecting Intention Through Motor-Imagery-Triggered Pupil Dilations

David Rozado, Martin Lochner, Andreas Düenser, Ulrich Engelke. *Human–Computer Interaction*

Development of a low-cost upper limb rehabilitation system using BCI, eye-tracking and direct visual feedback

A Duenser, D Rozado, B Howell, G Rosolen, M Callisaya, M Lochner, M Cochrane. *Proceedings of the 11th International Conference on Disability, Virtual Reality & Associated Technologies*

Analysis of maritime team workload and communication dynamics in standard and emergency scenarios

David Rozado, Martin Lochner, Andreas Duenser, Margareta Lutzhoft, Ben Brooks. *14th World Conference on Transport Research*

Voxvisio – Combining Gaze And Speech For Accessible HCI

D Rozado, A McNeill, D Mazur. *RESNA/NCART 2016 Conference Proceedings*

FaceSwitch-Low-Cost Accessibility Software for Computer Control Combining Gaze Interaction and Face Gestures

D Rozado, J Niu, A Duenser. *Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction*

Combining EEG with Pupillometry to Improve Cognitive Workload Detection

D Rozado, A Dunser. *Computer 48 (10), 18-25*

Improving Video Based Heart Rate Monitoring

J Lin, D Rozado, A Duenser. *23rd Australian National Health Informatics Conference (HIC 2015)*

Gaze dependant prefetching of web content to increase speed and comfort of web browsing

D Rozado, A El Shoghri, R Jurdak. *International Journal of Human-Computer Studies 78, 31-42*

Visual and Manual Control for Human-Robot Tele-operation

A Duenser, M Lochner, U Engelke, D Rozado. *IEEE Computer Graphics and Applications, 1-1*

Improving the Performance of an EEG-Based Motor Imagery Brain Computer Interface Using Task Evoked Changes in Pupil Diameter

D Rozado, A Duenser, B Howell. *PloS one 10 (3), e0121262*

Controlling a Smartphone Using Gaze Gestures as the Input Mechanism

D Rozado, T Moreno, J San Agustin, FB Rodriguez, P Varona. *Human–Computer Interaction 30 (1), 34-63*

Interacting with objects in the environment using gaze tracking glasses and speech

D Rozado, L Stephen, N Kottege. *Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures*

Low cost human-robot gaze estimation system

K Ishac, D Rozado. *Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures*

Gaze enhanced speech recognition for truly hands-free and efficient text input during HCI

MV Portela, D Rozado. *Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures*

Mouse and keyboard cursor warping to accelerate and reduce the effort of routine HCI input tasks

D Rozado. *Human-Machine Systems, IEEE Transactions on 43 (5), 487-493*

Using gaze based passwords as an authentication mechanism for password input

D Rozado. *17th European Conference on Eye Movements. ECEM 2013, Lund, Sweden.*

Distributed Eye Tracking Network for Conveying Gaze of Remote Users in a Robotic Telepresence Scenario

D Rozado, B Ward, F Pauling. *17th European Conference on Eye Movements. ECEM 2013, Lund, Sweden.*

Interacting with Objects in the Environment by Gaze and Hand Gestures
J Hales, D Rozado, D Mardanbegi. *17th European Conference on Eye Movements. ECEM 2013, Lund, Sweden.*

Visualization of strand melting temperature in DNA Origami Design using caDNAno
D Rozado, P Valencia, G Coia, B Muir, O Hutt, D Winkler. *International Conference on Emerging Advanced Nanomaterials - ICEAN*

Low cost remote gaze gesture recognition in real time
D Rozado, FB Rodriguez, P Varona. *Applied Soft Computing 12 (8), 2072-2084*

Extending the bioinspired hierarchical temporal memory paradigm for sign language recognition
D Rozado, FB Rodriguez, P Varona. *Neurocomputing*

A high-resolution anatomical atlas of the transcriptome in the mouse embryo
G Diez-Roux, S Banfi, M Sultan, L Geffers, S Anand, D Rozado, A Magen, ... *PLoS Biol 9 (1), e1000582*

Gaze gesture recognition with hierarchical temporal memory networks
D Rozado, F Rodriguez, P Varona. *Advances in Computational Intelligence, 1-8*

Gliding and Saccadic Gaze Gesture Recognition in Real Time
D Rozado, J San Agustin, F Rodriguez, P Varona. *ACM Transactions on Intelligent Interactive Systems*

Optimizing hierarchical temporal memory for multivariable time series
D Rozado, F Rodriguez, P Varona *Artificial Neural Networks–ICANN 2010, 506-518*

Teaching

Data Science and Machine Intelligence
Otago Polytechnic - Bachelor of Information Technology
2015, 2016, 2017, 2018

This course provides a broad introduction to Machine Intelligence/Data Science with an emphasis on the intuition and the applications behind the concepts. The course aims for students to be able to analyse a data problem and based on a reasoned argument choose and deploy the appropriate machine learning tool to solve the problem and obtain useful/actionable information from the raw data. Content includes: classification, regression, clustering, dimensionality reduction, web scraping, cloud AI services, deep learning, convolutional neural networks, LSTMs, word embeddings and reinforcement learning.

Algorithms and Data Structures
Otago Polytechnic - Bachelor of Information Technology
2018

This course aims to acquaint students with the wide variety of algorithms and data structures required for complex software development, to develop their programming technique to an advanced level, and to train them to analyse the efficiency and correctness of a computational solution. At the successful completion of the course, students are able to recognise programming as a general problem-solving discipline, perform basic efficiency analyses (Big-Oh), understand and recognise general algorithmic approaches (e.g. greedy, divide and conquer), use a variety of common data structures, (e.g. lists and their varieties,

stacks, queues, trees and their varieties, hash tables and graphs), generate correct and efficient algorithms for a variety of programming problems and evaluate and choose appropriate data structures for a variety of programming problems.

Web Programming 3

Otago Polytechnic - Bachelor of Information Technology

2015, 2016, 2017

In this paper, students are exposed to modern techniques in the design and delivery of information and functionality across the Web. Topics include the Django server side Framework, the MVC Design Pattern, node.js, JavaScript, AJAX, HTML5, CSS3, React, RESTful APIs and responsive design for multiple devices. This paper extends the skills and knowledge from Introductory Web Programming to cover enterprise scale systems and complex architectures.

Final Year Capstone Project

Otago Polytechnic - Bachelor of Information Technology

2015, 2016, 2017, 2018

During the final year of the Bachelor program in Information Technology students are involved in a group based capstone project that spans 2 semesters. During their capstone project students need to work for an external client to create a specific software or hardware system that addresses a real world problem for the client. My role in the capstone project has been to serve as supervisor of several student groups to keep them on track and provide technical advice and guidance in order to help them realize the final goals of their project.

Introduction to Computer Science

Universidad Autónoma de Madrid

2009

An undergraduate course in the school of engineering at Universidad Autónoma de Madrid. The course is a crash course on the MATLAB environment and its programming language. The course covers topics about: data structures, flow control, functions, recursivity, input/output and algorithms.

Fundamentals of Informatics

Universidad Autónoma de Madrid

2008

An undergraduate course offered by the school of computer science at Universidad Autónoma de Madrid. The course is an overview of fundamental concepts on computer science. The topics covered are: hardware and software, digital representation of information, operating systems and introduction to programming.