Ronald A. Cardenas

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RESEARCH INTERESTS

- Natural Language Processing: topic modeling, cross-lingual parsing, abstract meaning representations, word embedding, semantics, summarization, machine translation.
- Machine learning: probabilistic graphical models, structured prediction, deep learning, learning representations, tensor modeling, neural networks.
- Computational Social Sciences: information dissemination, retrieval, and assimilation in social media; exposure in crowd-sourcing systems; social network analysis.
- Robotics: symbol grounding problem, spacial-semantic representation, SLAM.
- Language grounding, image and video captioning, cognitive modeling.

CAREER GOAL

To become a fully-fledged XXI century scientist: a scientist with a truly multidisciplinary training, one capable of running a laboratory with students of different disciplines and appropriately integrate their skills to produce cutting-edge research for the benefit of society.

EDUCATION AND RESEARCH SUMMER SCHOOLS

B.S. Mechatronics Engineering (Robotics) August 2009 - December 2015
Universidad Nacional de Ingenieria, Lima, Peru.

- Summa Cum Laude
- Research Advisor: Alberto Coronado

Machine Learning Summer School Kyoto - 2015 August 2015
Kyoto University. Kyoto, Japan.

Summer by Design: Peru June 2015
ESAN University & Pennsylvania State University. Lima, Peru.

LxMLS: Lisbon Machine Learning Summer School 2014: Learning with Big Data July 2014
Instituto Superior Tecnologico. Lisbon, Portugal.

Competitive Programming Summer School: Maratona do Programacao January 2013
Universidade Estadual de Campinas. Sao Paulo, Brasil.

PUBLICATIONS AND POSTER SESSIONS

R.A. Cardenas, K.S. Bello and A.M. Coronado. "Labor market demand analysis for engineering majors in Peru using Shallow Parsing and Topic Modeling", *Machine Learning Summer School Poster Session, Kyoto, Japan, 2015.*

R.A. Cardenas, K.S. Bello, A.R. Valle, E.R Villota and A.M. Coronado. "Panorama of the market demand for Mechanical Engineers in South American Countries". *Proceedings of the 2015 ASME International Mechanical Engineering Congress and Exposition (IMECE2015): Volume 5, Engineering Education and Professional Development.*

A.R. Valle, K.S. Bello, **R.A. Cardenas**, E.R. Villota and A.M. Coronado. "Analysis of the Peruvian labor market demand in the area of mining maintenance". *Proceedings of the 2nd International Seminar on mining plant and equipment maintenance (MAPLEMIN 2015), Lima, Peru, July, 2015.*

ACHIEVEMENTS, HONORS AND AWARDS

- Research Institute of the Mechanical Eng. Department (INIFIM): Research Grant $3500 2015
- Universidad Nacional de Ingenieria: Grant for attendance to summer school $3000 2014,2015
- CONCYTEC - Peruvian Science and Technology Research Grant $1500 2013

- Dean's List 2012-2014
- 7th and 5th place in ACM-ICPC South American Regional Contest by IBM 2012,2014
- 11th Place, IEEExtreme World Wide Programming Competition 2013
- 1st Place, IEEExtreme - INTERCON National Programming Contest 2012

RESEARCH EXPERIENCE

Pennsylvania State University, State College, PA, United States
Department of Electrical Engineering and Computer Science December 2015 - to date
Advisor: Professor Julio Urbina

Meteor plasma trial classification using image processing
I am currently working on meteor radar data classification based on its plasma trial reflections. The data consists of radar echoes with low signal-to-noise ratio (SNR) values, manually labeled with one of four types of echoes. After frequency filtering, the signal is processed as an image. Morphological, signal duration and range level features are extracted and fed to a linear classifier, achieving 89% Accuracy in average. Work is currently performed remotely from Peru.

Universidad Nacional de Ingenieria, Lima, Peru
Research Institute of the Mechanical Eng. Department January 2014 - September 2015
Undergraduate Research Assistant
Advisor: Professor Alberto Coronado Matutti

Engineering job ads analysis using Topic Models and Shallow Parsing
My job consisted in analyzing the relationship between professional majors in the industry regarding only requirements requested in job ads published in Peruvian job-hunting websites.
I experimented with Latent Dirichlet Allocation, two kinds of configuration. The first one using the whole document's text. The second one using only extracted requirements and functions (text chunks) requested in the ad. In each configuration, two inference algorithms were tested: Variational Expectation Maximization and Gibbs Sampling. The text chunks in the ad were extracted using shallow parsing.
The results showed that text chunks allow convergence to a more meaningful optimum number of topics, using perplexity as model evaluation metric. In addition, it was observed that several professional majors are highly related regarding the requirements requested by industry.
The project was developed in Python and R.

Spanish Shallow Parsing and Name Entity Recognition from Job Ads
My job consisted in extracting the requirements, functions and professional majors requested in job advertisement in Spanish. I developed a shallow parser to extract requirement and functions as Noun Phrases and Verb Phrases, respectively. Professional majors were extracted by a Name Entity Recognizer. The models implemented were Structured Perceptrons trained over manually annotated data, achieving 91% F1 score in average.
The project also required me to implement automated web data extractors (spiders) and the design and maintenance of relational databases for its storage.

GISCIA: Artificial Intelligence Research Lab July 2013 - December 2013
Mechanical Dept., Universidad Nacional de Ingenieria, Lima, Peru
Undergraduate Research Assistant
Advisors: Prof. Ricardo Rodriguez and Prof. Ivan Calle

I worked on Localization, Mapping and Path-planning algorithms for ground mobile robots. The project included simulation in MatLab and implementation in an HPI Buggy car with Ackerman steering geometry. Th sensor used were a range-finder laser and 4 ultrasonic sensors, modeled using the likelihood field range finder model. The environment mapped was the Mechanics Department at my university and modeled as an Occupancy Grid Map.
For Localization, the particles filter and the EKF (modeling each grid cell as landmark) were compared. For mapping, the Occupancy Grid Mapping algorithm was used.
For path-planning, an hybrid A* algorithm was implemented. The algorithm returns path states

not limited to the grid cell center and implements a path smoother to produce more drivable paths.

PROFESSIONAL EXPERIENCE

Empleatron - Start-up Company, Lima, Peru
Co-founder, Software Developer — January 2014 - April 2015
www.empleatron.com
I worked on front-end and back-end web development of Empleatron: a recommendation system that fetches job ads from Peruvian job-hunting websites to recommend users what skills and knowledge acquire in order to advance in their career path, according to the latest trends in market demand.

PROGRAMMING & SOFTWARE

- *Programming Languages:*
  Python, C/C++, Java, R, Matlab, JavaScript, Shell scripting.
- *Databases:* MySQL, SQLite, MongoDB.
- *Data Mining Tools:* Weka, RStudio, Matlab, LionSolver, Gephi.
- *Big Data Frameworks:* Hadoop, Apache Spark.
- *Operating Systems:* Linux (Ubuntu, ArchLinux), Windows and Mac OSX.

TEACHING AND RESEARCH MENTORING

Artificial Intelligence & Control Systems Research Laboratory (GISCIA), Lima, Peru — 2013-2015

- Vice-president of GISCIA, organizing seminars, workshops and talks introducing undergraduates to research projects in Machine Learning.
- Training coach of undergraduate students teams for competitive programming contests, such as the ACM ICPC.

RELEVANT COURSES

- Artificial Intelligence, Autonomous Robotics, Artificial Intelligence for Robotics*.
- Probabilistic Graphical Models*, Statistical Inference*, Statistics and Probabilities, Numerical Methods, Linear Algebra.
- Machine Learning*, Natural Language Processing*, Computing for Data Analysis*, Neural Networks for Machine Learning*.
- Digital Control Systems, Modern Control, Analysis and Control of Robots.
- Object Oriented Programming, Intro to Parallel Programming*, Real-Time Systems Design, Digital Signal Processing.
- Research Methodology, Project Management.
  **: web-based courses*

LANGUAGES

English: TOEFL iBT score: 101
Spanish: Native
Portuguese: Elementary proficiency
Japanese: Elementary proficiency

PERSONAL REFERENCES

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