Guillem Duran Ballester

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Accomplishments

Education & Papers

Jun 2018 | **Solving Atari Games Using Fractals And Entropy,** ***Arxiv.org (In revision)***

Aug. 2017 | **Happiness, an inside job** *ASONAM 2017*
Churn prediction using employee likability, engagement and relative happiness

May 2017 | **General Algorithmic Search,** ***Arxiv.org***

Oct. 2016 | Degree Telecom. engineering: spec. in Telematics, **Politechnic Univ. of Catalonia**, Spain
Thesis: 'Time series and graph analysis in the Jupyter notebook'

Work experience

May 2017 - Present | **Research assistant** at University of the United Arab Emirates (Al Ain - Abu Dhabi), UAE. *Robots and media lab*

Jan - May 2017 | **Freelance data scientist**, Palma de Mallorca, Spain

Jul - Dec 2017 | **AI engineer** at Source{d} Madrid, Spain. *Reinforcement learning research*

Dec 2016 - Present | **Team member** at *Aplicaciones de los Sistemas Dinámicos Discretos y Continuos, MTM2016-74921-P (AEI/FEDER, UE).* UMH Univ., Elche, Spain

Jan - Dec 2016 | **AI researcher** at HCSoft Programación S.L, Murcia, Spain. *Metaheuristic and AI research*

Jun-Dec 2014 | **Cloud computing DevOps internship** at UPC. Installed, configured and administrated an OpenNebula-based cloud computing.

Talks

Oct. 2018 | **Talk & Workshop PyCon ES (Accepted)**
Talk: Hacking RL (Spanish version); Workshop: Introduction to data science Workshop

Jul. 2018 | **Talk at EuroPython 2018**
Hacking Reinforcement Learning
Presenting planing algorithms derived from Fractal AI theory for playing Atari at a superhuman level.

Nov. 2017 | **Invited speaker to PiterPy 2017 conferences**
Reinforcement learning for developers
An introduction to RL with Rick & Morty

Jul. 2017 | **Talk at EuroPython 2017**
Inside Airbnb: Visualizing data that includes geographic locations

May. 2017 | **Talk at PyData Barcelona**
Happiness inside a job: a social network analysis.
A talk about how to apply social network analysis techniques to machine learning.

Mar. 2017 | **Lecture at Universidad de Zaragoza**
Introduction to Fractal AI theory for researchers and Phd. students. (10 Hours)
Introductory course to fractal AI methods for solving complex artificial intelligence environments.

Feb. 2017 | **Workshop at PyData Mallorca**
Introduction to data science (5 Hours)

oct. 2016 | **Talk at PyconEs 2016**
Per Shaolin ad astra.
How to calculate and visualize the trajectory of the Juno spacecraft using Shaolin.

Jul. 2016 | **Hot topic talk at EuroPython 2016**
Interactive Data Kung Fu with Shaolin.
Interactive data visualization using Shaolin, a python library I programmed

AI Research experience

Over the years, I have managed to develop Fractal AI, a research project consisting on a theory of artificial intelligence based on first principles. I am part of a two people team that managed to develop a concept into a working theory, and developed a new family of planning algorithms that greatly outperform any other existing alternative.

As an undergraduate I researched on artificial intelligence as a hobby. During this time, I helped develop the theoretical foundations of our theory, and helped design and test a new set of environments to be solved by our agents.

At **HCSoft**, I developed and tested our novel AI theory, and learned how to find creative solutions to overcome technical limitations. My work there involved writing a Python implementation of our algorithms to be used with OpenAI gym, and as a global optimization algorithm. I also was in charge of designing and writing visualization and debugging tools.

At, **Source{d}**, I applied our techniques to leverage Reinforcement Learning algorithms. I learned how to communicate and work with a team, and follow good software development practices.

At, **UAE University**, I developed tools to generate high quality Reinforcement Learning datasets ready to use for research, and scaled our algorithms to be used in an Amazon Web services cluster.

We have published our findings as an open source project, and have documented our research in a blog and a YouTube channel:

Skills developed

- I'm an very fast learner
- I'm highly motivated
- Knowledge sharing
- Understanding AI papers
- Proposing new approaches to solve existing problems

Python tools I used

- Git, Pycharm, Jupyter
- Pandas, numpy
- Keras, TensorFlow
- Scikit-learn, Scipy
- OpenAI, Mujoco
- Mpl, Bokeh, Plotly

I researched

- Atari Games
- Sega Games
- Optimization
- Multi-agent flight
- Path finding
- Low prob. sampling

Available on GitHub

- Physics: *Calculating the trajectory of an spacecraft.*
- Networks: *Analyzing the GEANT network using graph theory.*
- Artificial intelligence: *Introduction to reinforcement learning.*
- NLP: *Analyzing a corpus using Natural Language Processing.*
- Optimization: *Notebooks on benchmarking global optimization algorithms.*
- Hacking: *How to build a JavaScript-based port scanner.*
- Teaching: *A tutorial on smart cities network design.*
- Data analysis: *Analyzing data from Airbnb.*
- Financial markets: *Analyzing correlation matrices of Forex market data.*
- Plotting data on maps: *Interactive maps displaying data from Airbnb.*
- Interactive plots: *Dashboards used to visualize interactive scatter plots.*
- Social networks analysis: *Data wrangling to build machine learning features using network theory.*
- Docker container: *Bleeding edge TensorFlow compiled for Python 3.7.*

Other Activities

- **PyData Mallorca organizer** since Feb 2017.
- **I love teaching science and Python** in workshops, lectures, and as a private teacher.