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Personal profile

For the past four years I have worked as a researcher at CENTRA/SIM (Multidisciplinary Centre for Astrophysics https://centra.tecnico.ulisboa.pt/). My experience is mainly with **Python**, including **parallel/distributed computing**, databases (**SQL**) and **machine learning**. The focus of my work has been the development of Data Mining/Machine Learning tools, particularly Bayesian inference models, for scientific exploitation of large datasets from the Gaia mission of the European Space Agency (ESA). I have also worked with code for PSF reconstruction in Adaptive Optics in the context of the OPTICON project. Prior to this I was a PhD researcher, modelling the spiral arms of our own Galaxy as traced by runaway stars[1].

Projects

2014 – 2017

Opticon – "Optical Infrared Co-ordination Network for Astronomy"

- Development and testing of software for PSF reconstruction in Adaptive Optics (GLAO), in the context of the MUSE-GALACSI instrument
- Tasks: coding of Python package; testing (including profiling); implementation of performance improvements (multiprocessing, cache); implementation of object-oriented interface; write the documentation
- **Python 2.7; C; JSON; FITS 3.0**
- **Tools: git/github; snakeviz; Visual Studio Code**

2013 – 2014

Gaia: National Participation in the Data Processing and Analysis Consortium (DPAC)

- Development of data mining/machine learning software for estimation of stellar parameters in large databases in the context of the European Space Agency's (ESA) mission Gaia
- Tasks: coding of two Python packages; implementation of Bayesian inference algorithms; implementation of distributed computing solutions (execnet package; Hadoop/Spark); testing; write the documentation
- **Python 2.7/3.6; Hadoop 2.7; Spark 2.2; JSON**
- **Tools: git/github; snakeviz; Visual Studio Code; dnsmasq 2.7**

1 http://www.newscientist.com/article/mg21729044.000

Positions

2013 – Present	**Researcher** CENTRA/SIM (https://centra.tecnico.ulisboa.pt/), Portugal
2012	**Researcher** University of Hertfordshire, UK
2006	**Sales consultant** Portugal Telecom, Portugal

Education

2007 – 2011	**PhD in Astrophysics – University of Herfordshire, UK** • Thesis: *Runaway Stars in the Galactic Halo: Their Origin and Kinematics* • Supervisor: Dr Ralf Napiwotzki
2004 – 2006	**Master degree in Statistics – Universidade do Porto, Portugal** • Thesis: *Um processo de risco perturbado: aproximações numéricas à probabilidade de ruína* • Supervisor: Drª Margarida Brito • Topics: ◦ Stochastic processes ◦ Machine learning ◦ Multivariate statistics • Final grade: "Muito Bom" (Very Good)
1998 – 2004	**First degree in Astrophysics (Physics/Applied Mathematics) – Universidade do Porto, Portugal** Final grade: 13

Publications

[1] Silva M. D. V. & Napiwotzki R., "High Galactic latitude runaway stars as tracers of the spiral arms", 2013, MNRAS, 431, 502-510 – Astro-ph: http://arxiv.org/abs/1302.0761v1

[2] Napiwotzki R. & Silva M. D. V., "Runaway and hypervelocity stars. The supernova connection", 2012, MEMORIE della Società Astronomica Italiana – Astro-ph: http://arxiv.org/abs/1109.4116

[3] Silva M. D. V. & Napiwotzki R., "Ejection velocities of high Galactic latitude runaway stars", 2011, MNRAS, 411, 2596 – Astro-ph: http://arxiv.org/abs/1010.3651

IT skills

General:

- OS administration/scripting (Linux and Windows)
- Git/Github
- Visual Studio Code
- misc. applications: Tex, Gimp, Photoshop, MS Office (Word, Excel, Access)

Developed packages:

- rpsfpy: software in Python for PSF reconstruction in Adaptive Optics
- Pysysp: Python package for synthetic stellar photometry : https://pypi.python.org/pypi/pysysp/1.0.1
- MASS: Massive MCMC sampler (Bayesian inference): https://github.com/mdusilva/mass
- Mamuto: Python package for distributed computing in clusters: https://github.com/mdusilva/mamuto
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Programming:

- Python, R, MATLAB, Fortran 90, C++ (basic level)
- parallel/distributed computing: Spark, Hadoop, MPI

Databases:

- PostgreSQL, SQLite, Python-SQL, PL/SQL

Web:

- HTML, CSS, Jekyll, Apache Web servers (configuration)

Python:

- Data Science: scikit-learn, Pandas, SPAMS (dictionary learning)
- distributed computing: execnet, pyspark
- Bayesian inference (MCMC): pymc

Languages

Fluent: Portuguese, English
Good understanding: French, Spanish
Basic Greek and German (level A1 certificate)

Other interests

I am a qualified Futsal referee. I like to play Football and Futsal, playing chess, Philosophy, travelling. I am also engaged in Science outreach activities directed at the general public.