# Joaquim **Leitão**

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| 🎓 Joaquim Leitão | Scopus Profile
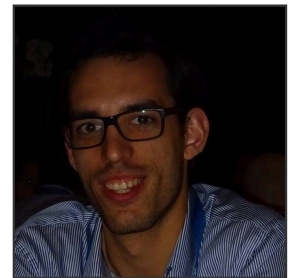
## **Exp**erience

### Nokia
*Amadora, Portugal*

DATA SCIENTIST
*Nov 2021–Present*

- Lead Data Scientist for one key area in the team (March 2023–Present)
- Predictive modelling, image processing and classification, task scheduling, natural language processing (NLP)
- Collaboration with researchers from Nokia Bell Labs, receiving solution handover and prototype industrialization

### Fundação para a Ciência e Tecnologia
*Coimbra, Portugal*

SCIENTIFIC RESEARCH GRANT
*Jun 2017–Jul 2021*

- Optimal week-ahead scheduling of household appliances, in the presence of uncertain baseline household electricity demand and micro generation (stochastic programming, mixed-integer linear programming)
- Historical dataset collection, cleaning, normalisation and inspection
- Probabilistic modelling of household electricity demand and micro generation, via Gaussian process-based and Quantile regression-based frameworks
- IEEE Access vol. 8, pp. 5699–5722 (2020)
- Merit award: Engineer Lecturers Award, Ordem dos Engenheiros – Região Centro (2019)

### Department of Informatics Engineering, University of Coimbra
*Coimbra, Portugal*

INVITED ASSISTANT PROFESSOR
*Nov 2014–Mar 2015*
*Feb 2017–Aug 2019*

- Data Analysis and Transformations (linear and non-linear systems, time-frequency analysis and time series analysis)
- Introduction to Programming using Java

### Department of Civil Engineering, University of Coimbra
*Coimbra, Portugal*

SCIENTIFIC RESEARCH GRANT
*Feb 2017–May 2017*

- Automate data collection, processing and visualization
- Pattern discovery and evaluation (Hierarchical and K-means clustering, dynamic time warping)
- 13th International Conference on Hydroinformatics, vol. 3, pp. 1123–1130 (2018)
- Water Science and Technology: Water Supply vol. 19(8), pp. 2323–2329 (2019)

### Department of Informatics Engineering, University of Coimbra
*Coimbra, Portugal*

SCIENTIFIC RESEARCH GRANT
*Sept 2015–Feb 2016*

- Development and validation rule-based control systems
- Exploit barriers, installed in upstream underground conduits of urban drainage systems, in order to delay its downstream propagation and avoid downstream flooding
- Best Paper Award: 4th Experiment@ International Conference (2017)

### Department of Informatics Engineering, University of Coimbra
*Coimbra, Portugal*

SCIENTIFIC RESEARCH GRANT
*Aug 2014–Aug 2015*

- Offline and online time-series outlier detection and accommodation
- Remote laboratory for introduction to programming and control systems courses
- PyDAQmx-Interface, remote control of three-tank system (Python 2.7, National Instruments 6008, 6009 boards)
- Conference demonstrations: 3rd Experiment@ International Conference (2015)

## **Edu**cation

### University of Coimbra – Faculty of Sciences and Technology
*Coimbra, Portugal*

PH.D. IN INFORMATION SCIENCE AND TECHNOLOGY
*Sep 2016–Jun 2021*

- Thesis: "Adaptive Supervisory Framework for Cyber-Physical Systems"
- **Final Classification: Summa Cum Laude (Highest Praise)**
- Advisors: Professors Alberto Cardoso, Bernardete Ribeiro and Paulo Gil

**University of Coimbra – Faculty of Sciences and Technology** *Coimbra, Portugal*

M.Sc. in Informatics Engineering *Sep 2014–Jun 2016*

- Thesis: "Flood Management in Urban Drainage: Contributions for the Control of Water Drainage Systems using Underground Barriers"
- **Final Classification: 17/20**
- Advisor: Professor Alberto Cardoso

**University of Coimbra – Faculty of Sciences and Technology** *Coimbra, Portugal*

B.Sc. in Informatics Engineering *Sep 2011–Jun 2014*

- **Final Classification: 17/20**
- Merit award: Top 3% students (2012 and 2013)

# Complementary Education

**Coursera (Online Course)**

Natural Language Processing with Classification and Vector Spaces *February 2023*

**Udemy (Online Course)**

Feature Selection for Machine Learning *Jun 2020*

**Udemy (Online Course)**

Feature Engineering for Machine Learning *Mar 2020*

# Skills

**Machine Learning**

- Regression, Classification, Supervised Learning, Unsupervised Learning, Optimisation, Time series, Mathematical Analysis
- Feature Engineering, Feature Selection, Data Cleansing, Normalisation and Visualization, Hypothesis Testing, Cross-Validation
- SVMs, ANNs, Deep Learning, Gaussian Processes, Decision Trees, Random Forests, Capsule Networks, Hierarchical and K-Means Clustering, PCA, LDA

**Programming**

- Python (Numpy, Scipy, Pandas, Scikit-Learn, TensorFlow, Matplotlib, Seaborn, Statsmodels, Jupyter)
- R, MATLAB, SQL, Bash, C/C++, Android, Go
- Java, JavaScript, Git, DVC, S3, HTML, CSS

# Languages

**Languages**

- Native Language: Portuguese
- Foreign Language: English
    - Certificate in Advanced English (C1)
    - First Certificate in English (B2)

# Event Organisation

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|---|---|---|
| 2020 | **Organisation member**, EDUCON 2020 – IEEE Global Engineering Education Conference | *Porto, Portugal* |
| 2019 | **Organisation member**, 5th Experiment@ International Conference | *Madeira, Portugal* |
| 2018 | **Organisation member**, 13th APCA International Conference on Automation Control and Soft Computing | *Azores, Portugal* |
| 2017 | **Organisation member**, 4th Experiment@ International Conference | *Madeira, Portugal* |
| 2013 | **Organisation member**, 2nd Experiment@ International Conference | *Madeira, Portugal* |

# Scientific Reviewer

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|---|---|
| 2020 | **IEEE Access**, |
| 2019 | **American Journal of Water Science and Engineering**, |
| 2017 | **22nd IberoAmerican Congress on Pattern Recognition**, |
| 2017 | **18th International Conference on Engineering Applications of Neural Networks**, |

# Scientific Publications

## Thesis

- Leitão, J. (2021 September). Adaptive Supervisory Framework for Cyber-Physical Systems: Optimal Scheduling of Smart Home Appliances. PhD thesis, University of Coimbra, Portugal
- Leitão, J. (2016 July). Flood management in urban drainage: Contributions for the control of water drainage systems using underground barriers. Master's thesis, University of Coimbra, Portugal

## Journals

- J. Leitão, Carlos M. Fonseca, P. Gil, B. Ribeiro and A. Cardoso (2021 June). A Compressive Receding Horizon Approach for Smart Home Energy Management. IEEE Access
- Leitão, J., Gil, P., Ribeiro, B., Cardoso, A. (2020 January). A Survey on Home Energy Management. IEEE Access
- Leitão, J., Simões, N., Marques, J. A. S., Gil, P., Ribeiro, B., Cardoso, A. (2019 August). Detecting Urban Water Consumption Patterns: A Time-Series Clustering Approach. Water Science and Technology: Water Supply
- Cardoso, A., Osório, D., Leitão, J., Sousa, V., and Teixeira, C. (2016 August). A Remote Lab to Simulate the Physiological Process of Ingestion and Excretion of a Drug. International Journal of Online Engineering, 12(4): 74-76, 2016

## Conference Papers

- Leitão, J., Gil, P., Ribeiro, B., and Cardoso, A. (June 2019). Smart Home Energy Management Supported by Cloud Computing. In 5th Experiment@ International Conference (exp.at'19), 2019 5th. IEEE
- Cardoso, A., Azevedo, D., Leitão, J., Ribeiro, B., and Gil, P. (February 2019). Application for Monitoring and Prediction of Energy and Water Consumption in Domestic Cyber-Physical Systems. In 16th International Conference on Remote Engineering and Virtual Instrumentation (REV), 2019, pages 28–37. Springer
- Leitão, J., Gil, P., Ribeiro, B., and Cardoso, A. (October 2018). Forecasting Household Energy Consumptions using Capsule Networks. In 24th Portuguese Conference on Pattern Recognition (RECPAD), 2018, pp. 136-137
- Cardoso, A., Leitão, J., Teixeira, C. (2018 September). Using the Jupyter Notebook as a tool to support the Teaching and Learning Processes in Engineering Courses. In 21st International Conference on Interactive Collaborative Learning - Special Session on Talking about Teaching 2018 (TaT'2018)
- Leitão, J., Gil, P., Ribeiro, B., and Cardoso, A. (July 2018). Application of Bees Algorithm to Improve Household's Efficiency via Scheduling of Energy and Water Appliances. In 10th International Conference on Information Technology and Electrical Engineering (ICITEE 2018), pages 100–105, 2018
- Leitão, J., Simões, N., Marques, J. A., Gil, P., Ribeiro, B., and Cardoso, A. (July 2018). Categorisation of Urban Water Consumptions. In Goffredo LaLoggia, Gabriele Freni, Valeria Puleo, and Mauro De Marchis, editors, HIC 2018. 13th International Conference on Hydroinformatics, volume 3 of EPiC Series in Engineering, pages 1123–1130. EasyChair, 2018
- Leitão, J., Gil, P., Ribeiro, B., and Cardoso, A. (2018 June). Improving Household's Efficiency via Scheduling of Water and Energy Appliances. In 13th APCA International Conference on Automatic Control and Soft Computing (Controlo 2018), pages 253–258, 2018
- Leitão, J., Cardoso, A., Marques, J. A., and Simões, N. (2017 June). Flood management in urban drainage: Contributions for the control of water drainage systems using underground barriers. In 4th Experiment@ International Conference (exp. at'17), 2017 4th, pages 286–291. IEEE

## Book Chapters

- Leitão, J., Cardoso, A., Marques, J. A. S., Simões, N. (2017 December). Contribuições para a Gestão de Inundações em Sistemas Urbanos de Drenagem através do Controlo de Barreiras Subterrâneas. In Ferreiro, Alfonso Lago and Fidalgo, André Vaz, editor, TICs Aplicadas para el aprendizaje de la Ingeniería 2017, chapter 4. IEEE Capítulos Españoly Português de la Sociedadde Educación
- Januário, F., Leitão, J., Cardoso, A., and Gil, P. (2017 September). Resilience enhancement in cyber physical systems: A multiagent-based framework. In Rocha, J., editor, Multi-agent Systems, chapter 11. InTech

## Conference Demonstrations

- Cardoso, A., Leitão, J., Gil, P., Marques, A. S., Simões, N.(March 2018) Using IPython to Demonstrate the Usage of Remote Labs in Engineering Courses – A Case Study Using a Remote Rain Gauge. In Michael E. Auer and Reinhard Langmann, editors, Smart Industry & Smart Education, pages 714–720, Cham, 2019. Springer International Publishing. ISBN 978-3-319-95678-7
- Cardoso, A., Osório, D., Leitão, J., Sousa, V., Graveto, V., and Teixeira, C. (2015, June). Demonstration of modeling and simulation of physiological processes using a remote lab. In 2015 3rd Experiment International Conference (exp.at'15),pages 103-104, June 2015
- Cardoso, A., Sousa, V., Leitão, J., Graveto, V., and Gil, P. (2015, June). Demonstration of identification and control of nonlinear systems using a remote lab. In 2015 3rd Experiment International Conference (exp.at'15), pages 101–102, June 2015
- Guerra, H., Cardoso, A., Sousa, V., Leitão, J., Graveto, V., and Gomes, L. M. (2015, June). Demonstration of programming in Python using a remote lab with Raspberry Pi. In 2015 3rd Experiment International Conference (exp.at'15), pages 101–102, June 2015
- Cardoso, A., Gil, P., Lourenço, J., Leitão, J., and Santos, A. (2014, February). Demonstration of an application for remote outlier detection and accommodation. In 2014 11th International Conference on Remote Engineering and Virtual Instrumentation (REV), pages 409-410, Feb 2014

## Conference Posters

- Leitão, J., Gil, P., Ribeiro, B., Cardoso, A. (July 2019). Cyber-Physical Home Energy Management in Smart Homes. Poster presented at: "encontro Ciência '19" Conference
- Leitão, J., Gil, P., Ribeiro, B., Cardoso, A. (July 2018). Adaptive Supervisory Framework for Cyber-Physical Systems. Poster presented at: "encontro Ciência '18" Conference

## Technical Reports

- Leitão, J., Gil, P., Ribeiro, B., Cardoso, A. (January 2018). Adaptive Supervisory Framework for Cyber-Physical Systems. CISUC Technical Report 2018-01. Department of Informatics Engineering of the University of Coimbra. Coimbra, Portugal

# Honors

| 2019 | **Merit Award**, Engineer Lecturers Award (Prémios Docentes Engenharia) awarded by Ordem dos Engenheiros - Região Centro |
| 2017 | **Best Paper Award**, Best Paper Award Presented at the 4th Experiment@International Conference - exp.at'17: "Flood Management in Urban Drainage: Contributions for the Control of Water Drainage Systems using Underground Barriers" |
| 2013 | **Merit Award**, Top 3% students of the BSc, Informatics Engineering course |
| 2012 | **Merit Award**, Top 3% students of the BSc, Informatics Engineering course |

# Invited Talks

| Nov 2017 | **Invited Speaker**, "Adaptive Supervisory Framework for Cyber-Physical Systems" | *University of Coimbra* |

# Activities

| HUMAN SENSOR AND GEOGRAPHIC INFORMATION SYSTEMS FOR DISASTER RISK MANAGEMENT TRAINING SCHOOL | *2015* |
| Development of a web application to collect volunteer geographical information and posterior analysis, validation and visualization | |
| KAGGLE HIGGS BOSON MACHINE LEARNING CHALLENGE | *2015* |
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| SOUTHWESTERN EUROPE REGIONAL CONTEST (SWERC) | *2014* |
| Faculty of Engineering, University of Porto | |
| "MARATONA INTER-UNIVERSITÁRIA DE PROGRAMAÇÃO (MIUP)" | *2014* |
| Faculty of Engineering, University of Porto | |
| 7$^{th}$ place | |
| "TORNEIO INTER-UNIVERSITÁRIO DE PROGRAMAÇÃO (TIUP)" | *2014* |
| Department of Informatics Engineering, University of Coimbra | |