

# António Leitão

MATHEMATICIAN · DATA SCIENTIST

Portuguese nationality, born 04/07/1996

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## EDUCATION

### M.Sc. in Data Science and Advanced Analytics

NOVA UNIVERSITY LISBON (INFORMATION MANAGEMENT SCHOOL)

- Thesis: Topological Expressiveness of Neural Networks. Grade: 20/20
- Supervisor: Dr. Giovanni Petri

Lisbon, Portugal

Sep. 2018 - Dec 2021

### Erasmus Studies Program

GEORG-AUGUST UNIVERSITÄT

Full scholarship awarded for a 6-months study period at Göttingen University

Göttingen, Germany

Mar. 2017 - Jul. 2017

### B.Sc. in Mathematics

NOVA UNIVERSITY LISBON

Lisbon, Portugal

Sep. 2014 - Aug. 2018

### International Baccalaureate Diploma Programme

COLÉGIO PLANALTO

Lisbon, Portugal

Sep. 2011 - May. 2014

## PUBLICATIONS

- |      |  |             |
|------|--|-------------|
| 2020 | <b>Giovanni Petri and António Leitão</b> , "On the Topological Expressive Power of Neural Networks" In: <i>NeurIPS 2020 Workshop on Topological Data Analysis and Beyond</i> , <a href="https://openreview.net/forum?id=I44kJPuvqPD">https://openreview.net/forum?id=I44kJPuvqPD</a> | Online      |
| 2020 | <b>António Leitão and Giovanni Petri</b> , "On the Topological Complexity of Decision Boundaries" In: <i>50th Scientific Meeting of the Italian Statistical Society</i> , pp. 588-594  | Pisa, Italy |

## REVIEW WORK

PROCEEDINGS OF THE ROYAL SOCIETY A: MATHEMATICAL, PHYSICAL AND ENGINEERING SCIENCES

Junior Reviewer

## TEACHING

### Masters' of Data Science and Advanced Analytics

NOVA UNIVERSITY OF LISBON (INFORMATION MANAGEMENT SCHOOL)

- Invited teaching assistant of Data Visualization. The expected student outcome was the creation of online interactive dashboards for efficient visualization of high volumes of data.

Lisbon, Portugal

Sep. 2019 - Feb. 2020

## EXPERIENCE

### CENTAI

JUNIOR RESEARCHER

- Collaborator at the CETI project, global research initiative alongside Harvard, MIT, Oxford, Imperial, to decipher, through information theory, sperm-whale speech in particular and alien communication in general.
- Continued work in Topological Data Analysis and Neural Networks.

Turin, Italy

Jun. 2022 -

### ISI Foundation

JUNIOR RESEARCHER

- Collaborator at the CETI project, global research initiative alongside Harvard, MIT, Oxford, Imperial, to decipher, through information theory, sperm-whale speech in particular and alien communication in general.
- Continued work in Topological Data Analysis and Neural Networks.

Turin, Italy

Oct. 2021 - Jun. 2022

### Feedzai

RESEARCH INTERN

- Responsible for the research project "EMO": creating machine learning methods for detecting money laundering entities in transaction datasets.

Lisbon, Portugal

Jun. 2021 - Oct. 2021

## ISI Foundation

RESEARCH INTERN

*Turin, Italy*

*Feb. 2020 - Jun. 2020*

- Full scholarship awarded to intern at the research group of Topological Data Analysis. (collective initiatives halted due to Covid-19.)
- Responsible for the research project "Topology of Learning": initiative to understand Neural Networks through Algebraic Topology, under the supervision of Dr. Giovanni Petri, since Feb. 2019.

## HONORS & AWARDS

2021	<b>5th Place</b> , ICLR Computational Geometry & Topology Challenge 2021	<i>Online</i>
2020	<b>2nd Place</b> , Nokathon 2020: Nokia's international machine learning competition	<i>Online</i>
2019	<b>1st Place</b> , Nokathon 2019: Nokia's international machine learning competition	<i>Lisbon, Portugal</i>
2019	<b>Scholarship</b> , Erasmus scholarship to pursue an internship in ISI Foundation and the University of Turin	<i>Turin, Italy</i>
2018	<b>Scholarship</b> , Winner of a fully funded scholarship to participate in a 10-day workshop on Geographical Information Systems (GIS) in Delft University.	<i>Delft, Netherlands</i>
2016	<b>Scholarship</b> , Merit scholarship to fund a 6 months erasmus study period at Georg-August Universität in Göttingen, Germany.	<i>Göttingen, Germany</i>

## LANGUAGES

<b>Portuguese</b>	<div><div></div></div>	Native
<b>English</b>	<div><div></div></div>	Fluent
<b>Italian</b>	<div><div></div></div>	Advanced
<b>German</b>	<div><div></div></div>	Adept (A2)

## PROGRAMMING

<b>Python</b>	<div><div></div></div>	Proficient
<b>L<sup>A</sup>T<sub>E</sub>X</b>	<div><div></div></div>	Comfortable
<b>C</b>	<div><div></div></div>	Currently Learning

### DBSampler: Library to sample decision boundaries.

PYTHON

- Library containing a method to sample decision boundaries of classification problems (binary and multiclass).
- Points are uniformly sampled from the edges of the Condensed Voronoi Diagram.
- Is theoretically exact (proof of convergence) and fast even in high dimensions. Also available in PyPI.

### UDiPH: Uniform Distributed Persistent Homology.

PYTHON

- Python package to create homeomorphism invariant simplicial filtrations.
- Also available in PyPI.

## EXTRACURRICULAR ACTIVITY

### SPORTS

#### Volleyball

*Lisbon, Portugal*

AEFT

*20014 - 2019*

- Played volleyball for the university team AEFT in the national university championship.
- Awarded best player of the university in the first year. In charge of player scouting for the subsequent years.

SPORT LISBOA E BENFICA (S.L.B.)

*2006 - 2014*

- Played volleyball for Sport Lisboa e Benfica, winning most regional championships and consistently achieving good ranking in the national championship.
- Briefly participated in the Portuguese National Volleyball team (under-18).

### MUSIC

#### Conservatory of Lisbon

*Lisbon, Portugal*

STUDENT

*2008 - 2014*

- Studied piano, musical theory and jazz. Achieved grade 5 on piano.

#### OTHER PROJECTS

*Ongoing*

- Self-taught in guitar and bass guitar. Currently learning the drums.
- Still involved in multiple amateur rock bands, some of which haven't failed yet.