

# DAVID CALHAS

david.calhas@tecnico.ulisboa.pt

Pronouns: He/Him/His

## EDUCATION

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<b>Instituto Superior Tecnico, Portugal</b> PhD in Computer Science and Engineering.	<i>September 2020 - October 2023</i>
<b>Instituto Superior Tecnico, Portugal</b> Master in Computer Science and Engineering.	<i>September 2017 - July 2019</i> Mark: 16/20
<b>Instituto Superior Tecnico, Portugal</b> Bachelor in Computer Science and Engineering.	<i>September 2014 - July 2017</i> Mark: 15/20

## PROJECTS

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### Using Electroencephalography for Schizophrenia Diagnosis

In the context of this project I built a siamese neural network model for feature extraction on top of a Short-Time Fourier Transform of the EEG signal. It included convolutional layers and was trained using adaptative moment optimization. The impact of this study to psychiatry is notable, as it provides an approach that improves ambulatory diagnoses of Schizophrenia with nearly +20pp in accuracy and sensitivity. Hyperparameters were tuned using Bayesian optimization. Publication: On the Use of Pairwise Distance Learning for Brain Signal Classification with Limited Observations.

### Electroencephalography to Functional Magnetic Resonance Imaging Synthesis

The goal of this project was to use machine learning techniques to synthesize fMRI signal from the neuronal activity of the human brain (EEG). The neural network was built with resnet blocks, Fourier features and self-attention mechanisms. More information at the project's repository: [https://dcalhas.github.io/eeg\\_to\\_fmri/](https://dcalhas.github.io/eeg_to_fmri/)

## MOST IMPORTANT PUBLICATIONS

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**On the use of pairwise distance learning for brain signal classification with limited observations -**  
*May 2020 - Artificial Intelligence in Medicine*

**EEG to fMRI Synthesis Benefits from Attentional Graphs of Electrode Relationships -** July 2023 -  
Machine Learning for Health Care

## WORK EXPERIENCE

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**INESC-ID, Lisbon, Portugal** *August 2019 - October 2023*  
*PhD Researcher*

- Working with Multi-Variate Time Series and Signal Synthesis.

**Instituto Superior Tecnico, Lisbon, Portugal** *September 2019 - present*  
*Teaching Assistant*

- Artificial Intelligence (CS Bsc - 2019-2023).
- Autonomous Agents and Multi Agent Systems (CS Msc - 2019-2021).
- Machine Learning (CS Bsc - 2021-2023).

**Champalimaud Centre for the Unknown, Lisbon, Portugal** *January 2023 - June 2023*  
*Visiting researcher*

- Natural Intelligence Lab.

## INTERNATIONAL EXPERIENCE

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Research with Prof. Enrique Romero at Universitat Politcnica de Catalunya;  
Jules Padova from Synthesia.

## FELLOWSHIPS

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ILU project with reference DSAIPA/DS/0111/2018;  
WISDOM project with reference DSAIPA/DS/0089/2018;

FCT PhD scholarship with reference SFRH/BD/5762/2020.

## HONOURS

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Excellence in Teaching - 19/20, 20/21, 21/22.

## EXTRA-CIRRUCULAR

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- Swimming (2013 to **present**)
- Theater at GTIST - Actors' School (2022 to **present**)

## RESEARCH PLATFORMS IDENTIFIERS

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Platform	ORCID	Researcher	Scopus	Ciencia	Scholar
ID	0000-0001...	57575	57216750828	9A1C-63A...	N5UpAJk...

## PUBLICATIONS

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Calhas, David and Romero, Enrique and Henriques, Rui, **On the use of pairwise distance learning for brain signal classification with limited observations**, in Artificial intelligence in medicine by Elsevier, 2020;

Calhas, David and Henriques, Rui, **fMRI Multiple Missing Values Imputation Regularized by a Recurrent Denoiser**, in Artificial Intelligence in Medicine: 19th International Conference on Artificial Intelligence in Medicine by Springer, 2021;

Calhas, David and Henriques, Rui, **Fitting Regularized Population Dynamics with Neural Differential Equations**, in Advances in Neural Information Processing Systems Workshop The Symbiosis of Deep Learning and Differential Equations, 2021;

Calhas, David and Manquinho, Vasco M and Lynce, Ines, **Automatic Generation of Neural Architecture Search Spaces**, in Association for the Advancement of Artificial Intelligence Workshop Combining Learning and Reasoning: Programming Languages, Formalisms, and Representations, 2022;

Calhas, David, **EEG-to-fMRI: Neuroimaging Cross Modal Synthesis in Python**, in Scipy Conference, 2023;

Calhas, David and Henriques, Rui, **EEG to fMRI Synthesis Benefits from Attentional Graphs of Electrode Relationships**, in Machine Learning for Health Care Conference, 2023;

Calhas, David and Henriques, Rui, **EEG to fMRI Synthesis: Is Deep Learning a candidate?**, in International Conference on Information Systems Development, 2023;

## COMMUNICATIONS - POSTERS

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**EEG to fMRI Synthesis**, PhD track at Symposium on Intelligent Data Analysis;

**Fitting Regularized Population Dynamics with Neural Differential Equations**, at Advances in Neural Information Processing Systems Workshop The Symbiosis of Deep Learning and Differential Equations;

**Automatic Generation of Neural Architecture Search Spaces**, at Association for the Advancement of Artificial Intelligence Workshop Combining Learning and Reasoning: Programming Languages, Formalisms, and Representations;

**EEG-to-fMRI: Neuroimaging Cross Modal Synthesis in Python**, at Scipy Conference;

## COMMUNICATIONS - TALKS

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**EEG to fMRI Synthesis**, PhD track at Symposium on Intelligent Data Analysis;

**Fitting Regularized Population Dynamics with Neural Differential Equations**, at Advances in Neural Information Processing Systems Workshop The Symbiosis of Deep Learning and Differential Equations;

**EEG to fMRI Synthesis: Quantifying Uncertainty**, Machine Learning in Science Workshop, <https://workshopmachinelearning.weebly.com/>;

**EEG to fMRI Synthesis: Extrapolation for Diagnostic Settings**, ESR Talks by INESC-ID;

**EEG to fMRI Synthesis Benefits from Attentional Graphs of Electrode Relationships**, Machine Learning for Health Care Conference;

EEG to fMRI Synthesis: Is Deep Learning a candidate?, International Conference on Information Systems Development;

## RESEARCH - REVIEW

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Neuroimage Reports;  
IEEE Transactions on Neural Networks and Learning Systems;  
IEEE Access;  
Neuroimage;  
Imaging Neuroscience;  
Statistical Papers;  
IEEE Journal of Bioengineering for Health Informatics;  
Journal of Applied Clinical Medical Physics;

## PROGRAMMING SKILLS

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Skill	Python	Julia	C++	Tensorflow	Numpy	Matplotlib	Latex	Tikz	Git
Familiarity <sup>1</sup>	5	3	3	5	4	5	4	4	3

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<sup>1</sup>Ability is classified from 0 to 5, being 0 completely new to it and 5 an expert with everyday use.