



# David Semedo

PHD · ASSISTANT RESEARCHER · MULTIMODAL DEEP LEARNING

Lisbon, Portugal

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## Summary

PhD Assistant Researcher focused on Deep Learning approaches for Multimedia and Natural Language Processing.

His Ph.D. topic focused on computationally bridging vision and language over time, by modeling multimodal data interactions and their evolution, using deep learning architectures and large-scale data collections. Currently investigating open and domain-specific dialog systems, based on deep learning architectures, using data-driven approaches.

**Expertise and Interests :** deep learning and machine learning for multimedia, natural language processing and data mining.

## Work Experience

### Senior Researcher - CMU Portugal iFetch Project

Sept. 2020 - PRESENT

NOVA SCHOOL OF SCIENCE AND TECHNOLOGY

Lisbon, Portugal

- Domain-specific multimodal dialog agents.
- Neural approaches for multimodal dialog systems.

### Research Assistant - GoLocal Project (CMUP-ERI/TIC/0046/2014)

Jan. 2019 - Aug. 2020

NOVA SCHOOL OF SCIENCE AND TECHNOLOGY

Lisbon, Portugal

- Temporal multimodal deep learning methods for cross-modal embedding learning and retrieval.
- Large-scale data mining and natural language processing for text understanding.

### Research Assistant - COGNITUS H2020 project (Ref.687605)

Jan. 2016 - Dez. 2018

NOVA SCHOOL OF SCIENCE AND TECHNOLOGY

Lisbon, Portugal

- Deep Learning and Machine Learning methods for multimodal (images/video and text) content semantic analysis and retrieval;
- Natural Language Processing for keyword extraction and understanding, SPAM filtering, and text search;
- Data mining from large-scale social-media collections;
- Collaboration with BBC R&D, Queen Mary University, Vitec, FORTHNet, FORTH, ARRIS-Pace.

### Lab Instructor - LxMLS 2016

July 2016

INSTITUTO SUPERIOR TÉCNICO, UNIVERSIDADE DE LISBOA

Lisbon, Portugal

- Lab Instructor for Lisbon Machine Learning School 2016 (<http://lxmls.it.pt/2016/>).

### Research Assistant - Restrict to Plan (QREN) Project (Ref.34091)

Jul. 2014 - Sep. 2015

NOVA SCHOOL OF SCIENCE AND TECHNOLOGY

Lisbon, Portugal

- Vehicle Scheduling Problems: Stochastic optimization strategies for large combinatorial problems;
- CPU Parallelization techniques for NUMA-based clusters;
- Collaboration with TECMIG.

### Linux Distribution Developer and Maintainer

Jan. 2013 - Jul 2013

CAIXA MÁGICA SOFTWARE

Lisbon, Portugal

- Debian Packages Full Cycle: creation, compilation, testing and deployment;
- Development of a Debian-based educational Linux distribution - Openmillenium Project;
- Responsible for the administration of Caixa Mágica distributions: package updates integration/compilation and deployment.

### Junior Research Assistant

Feb. 2013 - May 2013

NOVA SCHOOL OF SCIENCE AND TECHNOLOGY

Lisbon, Portugal

- Intrusion tolerant routing protocols for Ad-hoc Wireless Sensor Networks (IEEE 802.15.4). Advised by Prof. Henrique Domingues.

## Education

### NOVA School of Science and Technology

Jan. 2016 - Jul. 2020

PH.D., COMPUTER SCIENCE

- Thesis: Bridging Vision and Language over Time with Neural Cross-modal Embeddings.
- Advisor: João Magalhães.

## NOVA School of Science and Technology

M.Sc. COMPUTER SCIENCE AND ENGINEERING

- Thesis: *A Public Transport Bus Assignment Problem: Parallel Metaheuristics Assessment*;
- Advisors: Pedro Barahona and Pedro Medeiros.

## NOVA School of Science and Technology

B.Sc. COMPUTER SCIENCE AND ENGINEERING

2013 - 2015

18 out of 20

2010 - 2013

16 out of 20

## Publications

- Ferreira, R., M. Leite, D. Semedo, and J. Magalhães, **Open-Domain Conversational Search Assistant with Transformers**, European Conference on Information Retrieval (ECIR), 2021, Lucca, Italy (**CORE A**)
- Semedo, D., **Towards Open-domain Vision and Language Understanding with Wikimedia**, In Proceedings of the Web Conference, Wiki Workshop, 2021, Ljubljana, Slovenia
- Semedo, David and João Magalhães, **Adaptive Temporal Triplet-Loss for Cross-Modal Embedding Learning**, Proceedings of the 28th ACM International Conference on Multimedia, 2020, Seattle, WA, USA (**CORE A\***)
- Marcelino, G., D. Semedo, A. Mourão, S. Blasi, M. Mrak, and J. Magalhães, **A Benchmark of Visual Storytelling in Social Media**, Proceedings of the 2019 ACM on International Conference on Multimedia Retrieval (ICMR), 2019, Ottawa, Canada
- Semedo, D. and J. Magalhães, **Dynamic-Keyword Extraction from Social Media**, European Conference on Information Retrieval (ECIR), 2019, Cologne, Germany (**CORE A**)
- Semedo, David and Joao Magalhaes, **Cross-Modal Subspace Learning with Scheduled Adaptive Margin Constraints**, Proceedings of the 27th ACM International Conference on Multimedia, 2019, Nice, France (**CORE A\***)
- Semedo, David and Joao Magalhaes, **Diachronic Cross-Modal Embeddings**, Proceedings of the 27th ACM International Conference on Multimedia, 2019, Nice, France (**CORE A\***)
- Awad, George, Asad Butt, Keith Curtis, Yooyoung Lee, Jonathan Fiscus, Afzad Godil, David Joy, Andrew Delgado, Alan Smeaton, Yvette Graham, et al., **TRECVID 2018: Benchmarking video activity detection, video captioning and matching, video storytelling linking and video search**, Proceedings of TRECVID 2018, 2018
- Semedo, D. and J. Magalhaes, **Temporal Cross-Media Retrieval with Soft-Smoothing**, Proceedings of the 26th ACM International Conference on Multimedia (ACM MM), 2018, Seoul, Republic of Korea (**CORE A\***)
- Semedo, D., J. Magalhães, and F. Martins, **Inferring User Gender from User Generated Visual Content on a Deep Semantic Space**, 2018 26th European Signal Processing Conference (EUSIPCO), 2018, Rome, Italy
- Semedo, D. and J. Magalhães, **Convolutional Neural Networks for Medical Image classification - NovaSearch at ImageCLEFmed 2016 Subfigure Classification Task**, Working Notes of CLEF 2016 - Conference and Labs of the Evaluation forum, 2016, Évora, Portugal
- Semedo, D., P. Barahona, and P. Medeiros, **Asynchronous Parallel Ant-Colony Optimization Strategies: Application to the Multi-Depot Vehicle Scheduling Problem with Line Exchanges**, INForum-Simpósio de Informática (INFORUM). 2015, Covilhã, Portugal

## Awards

2019 **Finalist Top-3**, AIIA - Altice Innovation Award 2019: **Powering Live Event-Plots with Media AI**.

2019 **Student Travel Grant**, ACM Multimedia 2019.

Nice, France

## Activities

### Organizer (Local Chair) and Bidder for the premier conference on Multimedia

ACM MULTIMEDIA 2022.

Lisbon, Portugal

Oct. 2022

### Volunteer at Neural Information Processing Systems (NeurIPS) conference

2020

### Industry Talk

TITLE: BRIDGING VISION AND LANGUAGE OVER TIME: TEMPORAL CROSS-MODAL EMBEDDINGS, FARFETCH.

October 2020

### Webinar Talk

TITLE: WEBINAR ON "DEEP MULTIMODAL AND CROSS-MODAL EMBEDDINGS", DATA SCIENCE PORTUGAL (DSPT).

July 2020

### ECIR 2020 Organization: Local Support

EUROPEAN CONFERENCE ON INFORMATION RETRIEVAL 2020

April 2020

### Seminar Talk

TITLE: BRIDGING VISION AND LANGUAGE OVER TIME WITH NEURAL CROSS-MODAL EMBEDDINGS, NOVA LINCS SEMINAR.

January 2020

## Student Volunteer at ACM Multimedia conference

Nice, France

2019

## Poster Presentation at 2nd NOVA Science day

NOVA SCIENCE DAY.

Lisbon

2019

## Poster Presentation at Encontro Ciência

ANNUAL SCIENCE AND TECHNOLOGY MEETING FOR PORTUGUESE RESEARCHERS.

Lisbon

2016-2019

## Organizer of TRECVID 2018 Linking Task: Social Media Video Storytelling

Gaithersburg, MD, USA

TRECVID IS THE PREMIER ANNUAL INTERNATIONAL WORKSHOP EVENT FOR EVALUATING CONTENT-BASED RETRIEVAL OF MULTIMEDIA AND DIGITAL VIDEO.

Nov. 2018

- Aimed to advance the area of visual summarization, with collaborative videos, images and texts from professional and social-media users.

## EXPO FCT

SCIENCE FAIR SHOWCASING THE UNIVERSITY RESEARCH FOR HIGH-SCHOOL STUDENTS.

2012, 2016-2019

## Program Committee and Reviewing Activities

2021	<b>Reviewer</b> , Association for Computational Linguistics (ACL-IJCNLP)	Bangkok, Thailand
2021	<b>Program Committee Member - Reviewer</b> , International Joint Conference on Artificial Intelligence (IJCAI)	Montreal, Canada
2020	<b>Program Committee Member - Reviewer</b> , ACM Multimedia (ACM MM)	Seattle, USA
2020	<b>Journal Reviewer</b> , ACM Transactions on Multimedia Computing, Communications and Applications (Q1)	
2019	<b>Program Committee Member - Reviewer</b> , ACM Multimedia (ACM MM)	Nice, France
2018	<b>Reviewer</b> , ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR)	Michigan, USA
2018	<b>Reviewer</b> , ACM International Conference on Multimedia Retrieval (ICMR)	Yokohama, Japan
2018	<b>Reviewer</b> , International Conference on Theory and Practice of Digital Libraries (TPDL)	Porto, Portugal
2017	<b>Reviewer</b> , ACM International Conference on Multimedia Retrieval (ICMR)	Bucharest, Romania
2017	<b>Reviewer</b> , IEEE International Conference on Multimedia and Expo (ICME)	Hong Kong
2016	<b>Reviewer</b> , ACM International Conference on Multimedia Retrieval (ICMR)	New York, USA

## Teaching

2021	<b>Databases</b> , B.Sc. Computer Science course
2020	<b>Information Retrieval (Invited Lecture+Lab)</b> , Word Embeddings: Word2vec, skip-grams, Diachronic Embeddings, BERT, Applications. M.Sc. Computer Science course
2020	<b>Computational Logic</b> , B.Sc. Computer Science course
2019	<b>Algorithms and Data Structures</b> , B.Sc. Electrical and Computer Engineering course
2018	<b>Web Search and Data Mining</b> , M.Sc. Computer Science course
2015	<b>Algorithms and Data Structures</b> , B.Sc. Computer Science course
2014	<b>Algorithms and Data Structures</b> , B.Sc. Electrical and Computer Engineering course

## Students Advising

2021	<b>Ph.D. Rafael Ferreira</b> , (ongoing) Learning Reinforced Multimodal-Dialog Strategies for Conversational AI Agents, Co-advisor
2021	<b>M.Sc. Diogo Silva</b> , (ongoing) Dialog Generation for Recommendation Agents, Co-advisor
2021	<b>M.Sc. Diogo Tavares</b> , (ongoing) Joint Dialog State Tracking and Slot Filling with the Transformer, Co-advisor
2021	<b>M.Sc. Jonas Rodrigues</b> , (ongoing) Metric Learning for Session-based Recommendation in Conversational Systems, Co-advisor
2020	<b>M.Sc. Rafael Ferreira</b> , Tracking Context in Conversational Search: From Utterances to Neural Embeddings, Co-advisor - <b>20 out of 20</b>
2020	<b>M.Sc. Mariana Ferreira</b> , Knowledge-Driven Answer Generation for Conversational Search, Co-advisor - <b>19 out of 20</b>
2020	<b>M.Sc. Ruslan Padnevyh</b> , SmartyFlow - Robust Facial Biometrics for Virtual Identification, Co-advisor - <b>19 out of 20</b>

# Computer Literacy

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## Languages

- **Main Programming Languages (Proficient level):** Python, C/C++, Java, SQL, Bash;
- **Programming Languages:** MATLAB, Javascript, OCaml, Prolog, Assembly.

## Deep Learning, Machine Learning and Data Science

- **Deep Learning:** PyTorch, Keras, Tensorflow, Hugging Face, Theano;
- **Machine Learning and Data Science:** Python ML stack: Scipy+Pandas+Scikit-learn+Matplotlib, Statsmodels, XGBoost, Scrapy;
- **Vision:** OpenCV, Scikit-image, FFmpeg;
- **NLP:** NLTK Toolkit, Gensim, SpaCy, Tesseract (OCR), Stanford POS Tagger, Stanford NER, WordNet.

## Big Data - Parallel/Distributed/Cloud Computing Libraries and Frameworks

- MPI, OpenMP, HTCondor, Hadoop, Spark, RMI;
- Cloud: Amazon AWS + S3.

## Other Frameworks and Technologies

- LaTeX, RabbitMQ, Docker (Docker Compose), Elasticsearch, Android, GIT.

## Web Development

- **Frameworks:** Django, Flask, Ruby on Rails;
- HTML/XHTML, XML, CSS, JQuery.

## Computing Infra-structures and Operating Systems

- Multi-CPU and Multi-GPU deep learning machine setup and management;
- Proficient with Linux (Debian, CentOS) and Windows - bash scripting/terminal.