Curriculum Vitae

Eduardo Conde-Sousa

econdesousa@gmail.com; econdesousa@i3s.up.pt

Phone: +351 226 074 975

Personal webpage:	https://econdesousa.github.io
Google Scholar:	https://scholar.google.com/citations?hl=en&user=xi0xi2AAAAAJ
ORCID :	https://orcid.org/0000-0002-6591-5063
SCOPUS:	https://www.scopus.com/authid/detail.uri?authorId=55233686200

1. Personal data

Full Name: Eduardo Conde Silva de Sousa
Birthdate: 23.10.1979
Birth place: Lanhelas, Caminha, Portugal
Residence: Porto - Portugal
Citizenship: Portuguese

2. Current situation

Since 04/2018   Bioimage Analyst @ INEB – Instituto Nacional de Engenharia Biomédica, i3S – Instituto para a Inovação e Investigação em Saúde, University of Porto, Portugal

3. Profile

I hold three academic degrees in Mathematics and over the years I had developed very good programming skills in several environments and languages such as MATLAB, R, Python, ImageJ Macro, or Linux Shell Scripting. My mother tongue is Portuguese and I am a proficient user for understanding, speaking, and writing in English and Spanish.

My main research interests are in the development and application of software for mathematical modeling, simulation, and data analysis for the study of biological processes. Over the years, I developed models and bioinformatics tools on bioimage analysis, neurosciences, population, and forensic genetics, and genomics. Presently, the most relevant part of my work is focused on blending standard bioimage analysis techniques with deep learning algorithms to create novel mathematical models and deploy software applications in bioimage analysis, from basic biological sciences to medical diagnosis and therapeutic. A significant part of my efforts has been also devoted to dissemination and training activities, including the organization and lecturing at advanced courses and workshops, specifically in the field of bioimage analysis.

4. Computer skills and competences

Very good programming skills for languages such as ImageJ Macro or MATLAB

Good programming skils for languages such as R, Python, or NEURON simulation environment

Basic programming skills for languages such as C, C++ and Qt

Very good working skills for bioimage analysis software such as ImageJ, Ilastik, or CellProfiler

Good command skills for several technical software, e.g. VCFtools, BCFtools, SAMtools, PLINK, BLAST, mothur, ms, msHOT, bwa, etc.

5. Academic degrees

2014   PhD in Applied Mathematics
              Faculty of Sciences of University of Porto (FCUP), Porto, Portugal
              Thesis title: Computational Models for Information Storage in Spiking Neurons
              Supervisor: Dr. Paulo Aguiar (Institute for Biomedical Engineering, INEB, and Center of Mathematics of University of Porto, CMUP)
              Final classification: Approved with Distinction (maximum grade)

2004   MSc in Mathematics – Foundations and Applications
              Faculty of Sciences of University of Porto (FCUP), Porto, Portugal
              Thesis title: Grupóides e Sincronização em Sistemas de Células Acopladas (in Portuguese)
              Supervisor: Prof. Ana Paula Dias (Department of Mathematics, FCUP, and Center of Mathematics of University of Porto, CMUP)
              Final classification: Very Good (maximum grade)

2002   BSc in Mathematics – Educational branch
              Faculty of Sciences of University of Porto (FCUP), Porto, Portugal
              Final classification: 16 out of 20

6. Work experience

04/2018 – present   Bioimage Analyst at INEB – Instituto Nacional de Engenharia Biomédica, i3S – Instituto de Investigação e Inovação em Saúde, University of Porto, Portugal

02/ 2016 – 03/2018   Post-Doc fellow at Centre of Molecular and Environmental Biology (CBMA), Department of Biology, University of Minho, Braga, Portugal

12/ 2014 – 10/2015   Post-Doc fellow at Research Center in Biodiversity and Genetic Resources (CIBIO-inBIO)

09/2011	Teaching assistant at summer school EVMAT 2011, Center of Mathematics of University of Porto (CMUP), Portugal
2008 – 2013	External collaborator and consultant, Centre Multimedia of Porto Editora: creation, development, implementation, and validation of didactical software of Mathematics, Porto, Portugal
09/2004 – 08/2010	High school teacher of Mathematics (from 7th to 12th grades), Portugal
09/2003 – 08/2004	Teacher of Mathematics in Polytechnic Institute of Bragança, Bragança, Portugal
09/2001 – 08/2003	High school teacher of Mathematics (from 10th to 12th grades), Portugal

7. University scholarships

12/2014 – 09/2015	Post-doc grant in the R&D Project: "Assessing The Whole-Genome Structure and Variation of the Tropical Adapted Zebu Cattle (Bos indicus) using Dense SNP Maps.", ref: PTDC/CVT/117851/2010, financed by Portuguese Foundation for Science and Technology, Compete.
09/2010 – 10/2014	PhD scholarship: "Computational Models for Information Storage in Spiking Neurons", ref: SFRH/BD/65633/2009, financed by Portuguese Foundation for Science and Technology, POPH - QREN.

8. Participation in projects

8.1. Principal investigator

06/2018 – 05/2021	"eCSI-barcode – Efficient computational solutions for integrated DNA barcoding, metabarcoding, and associated high-throughput sequencing data analysis", ref: PTDC/BIA-OUT/29626/2017, Portuguese Foundation for Science and Technology, Institutions: University of Minho with two centers (CBMA and ALGORITMI) and IPATIMUP. *Between the project proposal and the project approvals' date, I moved to INEB, and the former co-PI and I permuted our administrative roles in the project.

8.2. Team member

01/2022 – 06/2023	"BioCoat: Engineered biomimetic hydrogel coating for improved biocompatibility of chronically-implanted neural electrodes", ref: EXPL/BTM-MAT/1499/2021, Portuguese Foundation for Science and Technology

10/2018 – 09/2022   "COMULIS: Correlated Multimodal Imaging in Life Sciences", ref: CA17121, European Cooperation in Science and Technology

10/2018 – 09/2021   "NIS-DNA: Early detection and monitoring of non-indigenous species (NIS) in coastal ecosystems based on high-throughput sequencing tools", ref: PTDC/BIA-BMA/29754/2017, Portuguese Foundation for Science and Technology

09/18 – 08/2021   "From Portugal back to Africa: uncovering the african roots of present-day Portuguese", ref: PTDC/SOC-ANT/30316/2017, Portuguese Foundation for Science and Technology

05/2017 – 04/2020   "PPBI: Plataforma Portuguesa de Bioimagem", ref: PINFRA/22122/2016, Portuguese Foundation for Science and Technology

05/2016 – 04/2020   "NEUBIAS: A new Network of European BioImage Analysts to Advance life Science Imaging", ref: CA15124, European Cooperation in Science and Technology

12/2014 – 09/2015   "Assessing The Whole-Genome Structure and Variation of the Tropical Adapted Zebu Cattle (Bos indicus) using Dense SNP Maps.", ref: PTDC/CVT/117851/2010, Portuguese Foundation for Science and Technology

9. Organization and lecturing at advanced courses & workshops

9.1. Main organizer and lecturer

Organizer and Lecturer of "Batch Analysis and Macro Development in ImageJ/Fiji: going beyond the basics" | 3rd Edition, 24 - 26 November 2021 (registrations open), Instituto de Investigação e Inovação em Saúde (i3S), Porto, Portugal

Organizer and Lecturer of "Batch Analysis and Macro Development in ImageJ/Fiji: going beyond the basics – online course" | 2nd Edition, 9 - 15 December 2020 (fully booked), i3S, Porto, Portugal

Organizer and Lecturer of "Batch Analysis and Macro Development in ImageJ/Fiji: going beyond the basics" | 1st Edition, 13 - 15 November 2019 (fully booked), i3S, Porto, Portugal

Organizer of BIAclub (BioImage Analysis Club), periodical presentations, i3S, Porto, Portugal

Organizer and Lecturer of the Workshop (18 hours) "Basic Concepts of Programming in R", 16-31 January 2017, Centre of Molecular and Environmental Biology (CBMA), Department of Biology, University of Minho, Braga, Portugal

9.2. Invited lecturer

Lecturer at "High Throughput Screening and Image Analysis for BioSciences" course (half-day session), 25 -28 May 2021, i3S, Porto, Portugal

Lecturer at "Introduction to Digital BioImage Analysis" course (half-day session), 24 - 27 September 2019, i3S, Porto, Portugal

Trainer at "6th NEUBIAS Training School for Early Career Investigators (TS12)" course, 14-17 October 2019, INEC-TEC, Porto, Portugal

Teaching Assistant at "2nd UPTEC's Future of Computing summer school: Coding my first brain – "Hello Brain" in neuromorphic computing" course (2h session), 01-05 July 2019, UPTEC, Porto, Portugal

Lecturer at "High-throughput Screening and Image Analysis for Biosciences" course (2h session), 27-31 May 2019, i3S, Porto, Portugal

Lecturer of the Workshop (30 hours) "Introduction to Scientific Programming with MATLAB", 22-30 April 2016; State University of Rio de Janeiro (UERJ), Rio de Janeiro, Brazil

10. Supervision of academic theses

2019 – present	Rita Pacheco Fernandes
	MSc in Bioinformatics and Computational Biology
	Faculty of Sciences of University of Porto (FCUP), Porto, Portugal
	Thesis title: 3D tracing of filament-like structures.
	Supervisor: Eduardo Conde-Sousa, PhD, INEB – Porto, Portugal
	Co-supervisor: Paulo Aguiar, PhD, INEB – Porto, Portugal
	Co-supervisor: Mónica Sousa, PhD, IBMC – Porto, Portugal
2019 – 2020	Luís Manuel Pacheco Neto
	MSc in Computer Science
	School of Engineering of University of Minho, Braga, Portugal
	Thesis title: An efficient and accurate framework for large-scale sequences of DNA barcodes.
	Supervisor: Alberto Proença, PhD, ALGORITMI – Braga, Portugal
	Co-supervisor: Eduardo Conde-Sousa, PhD, INEB – Porto, Portugal
2017 – 2018	Priscilla Heberle Almeida
	MSc in Forensic Genetics
	Faculty of Sciences of University of Porto (FCUP), Porto, Portugal
	Thesis title: X-chromosomal mapping – a family study for 10 short tandem repeat loci.
	Supervisor: Nádia Pinto, PhD, IPATIMUP/i3S
	Co-supervisor: Eduardo Conde-Sousa, PhD, INEB – Porto, Portugal

2016 – 2017   Raquel Sofia Miranda Simões
                     MSc in Bioinformatics
                     School of Engineering, University of Minho, Braga, Portugal
                     Thesis title: Distinguishing kinships beyond identity and paternity.
                     Supervisor: Eduardo Conde-Sousa, PhD, CBMA – Braga, Portugal
                     Co-supervisor: Nádia Pinto, PhD, IPATIMUP/i3S

2016 – 2017   Pedro Machado
                     MSc in Forensic Genetics
                     Faculty of Sciences of University of Porto (FCUP), Porto, Portugal
                     Thesis title: The influence of mutation models in kinship likelihoods.
                     Supervisor: Nádia Pinto, PhD, IPATIMUP/i3S
                     Co-supervisor: Eduardo Conde-Sousa, PhD, CBMA – Braga, Portugal

2016 – 2017   Arti Bandhana
                     MSc in Mathematical Engineering
                     Faculty of Sciences of University of Porto (FCUP), Porto, Portugal
                     Thesis title: Unravelling the genetic component of male infertility
                     Supervisor: Alexandra Lopes, PhD, IPATIMUP/i3S
                     Co-supervisor: Eduardo Conde-Sousa, PhD, CBMA – Braga, Portugal

11. Organization and lecturing at scientific events

11.1. Organizer

Main organizer of the 2020 HEROHE grand-challenge (https://ecdp2020.grand-challenge.org/), a parallel event of the 16th European Congress on Digital Pathology, with more than 800 participants.

11.2. Invited chair

Co-chair of one session at the European Society of Digital and Integrative Pathology (ESDIP) workshop, 24 November 2020, online event due to Covid-19 pandemic situation

11.3. Invited speaker

"The Evolution of Machine Learning", 2nd Ecosystem for Pathology Diagnostics with AI Assistance (EMPAIA) academy, 15 September 2021, online event due to Covid-19 pandemic situation

"The HEROHE challenge", 1st European Society of Digital and Integrative Pathology (ESDIP) Workshop, 24 November 2020, online event due to Covid-19 pandemic situation

"Computational Neuroscience", Human Neurobehavioral Laboratory Workshop: Research Methods in Neuroscience, December 2014, Catholic University of Porto, Portugal

"A working memory model capable of storing pattern sequences without synaptic plasticity", Mathematical Neuroscience Workshop, April 2012, Center of Mathematics of University of Porto (CMUP), Portugal

11.4. Oral communications
(Presented by*)

Pinto N., **Conde-Sousa E.**, Chen S., Pérez-Pardal L., Goyache F., Beja-Pereira A.*, Computational tools to exploit cattle exomes. 34th Conference of International Society of Animal Genetics, Xi'an, China, July 2014.

12. Informatics tools

Collection of bioimage analysis scripts and workflows available at
https://github.com/econdesousa/ImageAnalysis/

SE4BIA – Search Engine for BioImage Analysis (https://se4bia.i3s.up.pt/)

4SpecID – Cross-platform program to audit and annotate reference DNA libraries (https://4specid.github.io/)

DNA Database Validation – MATLAB toolbox to identify and correct inaccuracies in public genetic databases (https://github.com/econdesousa/dnaDatabaseValidation)

N3DFix – Post-processing tool to automatically find and fix swelling artifacts in neuronal reconstructions (https://github.com/econdesousa/n3dfix)

13. Publications
13.1. Publications in international peer-reviewed journals

17. Neto L., Pinto N., Proença A., Amorim A., **Conde-Sousa E.**, 4SpecID: Reference DNA Libraries Auditing and Annotation System for Forensic Applications (2021) Genes, 12, 61.; DOI: 10.3390/genes12010061

16. Freitas A., Aroso M., Barros A., Fernandez M., **Conde-Sousa E**., Leite M., Carvalho E., Ribeiro C. C., Ferreira R., Pêgo A. P., Vitorino R., Gomez-Lazaro M., Characterization of the striatal extracellular matrix in a mouse model of Parkinson's disease (2021) Antioxidants, 10(7), 1095; DOI: 10.3390/antiox10071095

15. Nelson G. et al. QUAREP-LiMi: A community-driven initiative to establish guidelines for quality assessment and reproducibility for instruments and images in light microscopy, (2021) J. Microscopy; DOI: 10.1111/jmi.13041 arXiv: arXiv:2101.09153 [q-bio.OT]

14. La Barbera D., Polónia A., Roitero K., **Conde-Sousa E.**, Della Mea V. Detection of HER2 from Haematoxylin-Eosin Slides Through a Cascade of Deep Learning Classifiers via Multi-Instance Learning (2020) J. Imaging, 6(9), 82; DOI: 10.3390/jimaging6090082

13. Vieira D., Esteves S., Santiago C., **Conde-Sousa E.**, Fernandes T., Pais, C., Soares P., Franco-Duarte R. Population analysis and evolution of Saccharomyces cerevisiae mitogenomes (2020) Microorganisms, 8(7), 1001; DOI: 10.3390/microorganisms8071001

12. **Conde-Sousa E.**, Pinto N., Amorim A., Reference DNA databases for forensic species identification: Auditing algorithms (2019) Forensic Science International: Genetics Supplement Series, 7 (1), pp. 564-566. DOI: 10.1016/j.fsigss.2019.10.091

11. Antão-Sousa S., **Conde-Sousa E.**, Gusmão L., Amorim A., Pinto N., Underestimation and misclassification of mutations at X chromosome STRs depend on population's allelic profile (2019) Forensic Science International: Genetics Supplement Series, 7 (1), pp. 718-720. doi: 10.1016/j.fsigss.2019.10.150

10. Barros D., **Conde-Sousa E.**, Gonçalves A.M., Han W.M., García A.J., Amaral I.F., Pêgo A.P., Engineering hydrogels with affinity-bound laminin as 3D neural stem cell culture systems (2019) Biomaterials Science, 7 (12), pp. 5338-5349. Doi: 10.1039/c9bm00348g

9. Rito T., Vieira D., Silva M., **Conde-Sousa E.**, Pereira L., Mellars P., Richards M.B., Soares P., A dispersal of Homo sapiens from southern to eastern Africa immediately preceded the out-of-Africa migration (2019) Scientific Reports, 9 (1), 4728, DOI: 10.1038/s41598-019-41176-3

8. Pinto N., Simões R., Amorim A., **Conde-Sousa E.**, Optimizing the information increase through the addition of relatives and genetic markers in identification and kinship cases (2019) Forensic Science International: Genetics, 40, pp. 210-218. DOI: 10.1016/j.fsigen.2019.02.019

7. Barros D., Parreira P., Furtado J., Ferreira-da-Silva F., **Conde-Sousa E.**, García A.J., Martins M.C.L., Amaral I.F., Pêgo, A.P., An affinity-based approach to engineer laminin-presenting cell instructive microenvironments, Biomaterials, Vol 192, 2019, doi:10.1016/j.biomaterials.2018.10.039.

6. Machado P., Gusmão L., **Conde-Sousa E.**, Pinto N., The influence of the different mutation models in kinship evaluation, Forensic Science International: Genetics Supplement Series http://dx.doi.org/10.1016/j.fsigss.2017.09.093

5. Goncalves J., **Conde-Sousa E.**, Egeland T., Amorim A., Pinto N., Key individuals for discerning pedigrees belonging to the same autosomal kinship class, Forensic Science International: Genetics, 19 March 2017, DOI: 10.1016/j.fsigen.2017.03.018

4. Olivieri A., Sidore C., Achilli A., Angius A., Posth C., Furtwängler A., Brandini S., Rosario Capodiferro M., Gandini F., Zoledziewska M., Pitzalis M., Maschio A., Busonero F., Lai L., Skeates R., Giuseppina Gradoli M., Beckett J., Marongiu M., Mazzarello V., Marongiu P., Rubino S., Rito T., Macaulay V., Semino O., Pala M., Abecasis G.R., Schlessinger D., **Conde-Sousa E.**, Soares P., Richards M.B., Cucca F., Torroni A., Mitogenome diversity in Sardinians: a genetic window onto an island's past, Mol Biol Evol. 2017 Feb 8. doi: 10.1093/molbev/msx082.

3. **Conde-Sousa E.**, Szücs P., Peng H., Aguiar P., N3DFix: an Algorithm for Automatic Removal of Swelling Artifacts in Neuronal Reconstructions, Neuroinformatics, 2016 doi:10.1007/s12021-016-9308-7

2. **Conde-Sousa E.**, Aguiar P., A working memory model for serial order that stores information in the intrinsic excitability properties of neurons, Journal of Computational Neuroscience, Volume 35, Issue 2, October 2013, pp 187-199

1. Pinto N., Magalhães M., **Conde-Sousa E.**, Gomes C., Pereira R., Alves C., Gusmão L., Amorim A., Assessing paternities with inconclusive STR results: the suitability of bi-allelic markers, Forensic Science International: Genetics, Volume 7, Issue 1, January 2013, Pages 16-21.

13.2. Publications in conference proceedings

Conde-Sousa E., Aguiar P., Conversion from spatial patterns of activity to sequences of neuronal activations using gate interneurons, BMC Neuroscience, July 2013, 14(Suppl. 1)

13.3. Other Publications

Conde-Sousa E., Aguiar P., Detailed mathematical models in neurobiology – Storing information in membrane conductances dynamics, CIM Bulletin, 2012, 31, 19–26.

13.4. Under review manuscripts

2. **Conde-Sousa E.**, Vale J., Feng M., Xu K., Wang Y., Della Mea V., La Barbera D., Montahaei E., Baghshah M. S., Turzynski, A., Gildenblat J., Klaiman E., Hong Y., Aresta G., Araújo T., Aguiar P., Eloy C., Polónia A., HEROHE Challenge: assessing HER2 status in breast cancer without immunohistochemistry or in situ hybridization

1. Pereira-Castro I., Garcia B., Curinha A., Neves-Costa A., **Conde-Sousa E.**, Moita L., Moreira A., MCL1 alternative polyadenylation is essential for cell survival and mitochondria morphology"

14. Commissions and Working Groups

Invited consultant of the working group "Segregation X STRs", Spanish and Portuguese Speaking Working Group of the International Society for Forensic Genetics

Invited developer of the "Cambridge Hackathon" of the BigNeuron Project, Human Brain Project, Welcome Trust (UK), Allen Institute for Brain Science (USA), International Neuroinformatics Coordinating Facility, Beijing University of Technology (China).

15. Jury of Dissertations

Jury of the MSc in Bioinformatics, School of Engineering, University of Minho, Braga, Portugal. Dissertation title: "Building a database of common genetic variation in the Portuguese population". Ana Raquel Ramos, December 5th, 2018.

Jury of the MSc in Bioinformatics, School of Engineering, University of Minho, Braga, Portugal. Dissertation title: "Estimating recombination frequency throughout the human genome using a phylogenetic-based method". Raquel dos Santos Silva, November 29th, 2016.

Jury of the MSc in Biophysics and Bionanosystems, School of Sciences, University of Minho, Braga, Portugal. Dissertation title: "Creation of databases of ageing-related drugs and statistical analysis and applied machine learning for the prioritization of potential lifespan-extension drugs". Diogo Gonçalves Barardo, August 11th, 2016.

16. Travel Grants

2019   Travel and accommodation grant to attend the Training School TS11 for BioImage Analysts and the Open Symposium/Showcase on Bioimage Analysis and Open Tools, Feb 1st – 8th 2019, Université du Luxembourg, Luxembourg

2012   Travel and accommodation grant to attend the Edinburgh Summer School in Integrative Computational Neuroscience, August 26th – September 2nd 2012, Institute for Adaptive and Neural Computation, School of Informatics, University of Edinburgh, Scotland

17. Attendance at training courses

Training School TS11 for BioImage Analysts, Feb 1st –5th 2019, Université du Luxembourg, Luxembourg

Imaris training course for facility staff, July 3rd – 4th 2018, Instituto Gulbenkiian de Ciência, Oeiras, Portugal

Optical Microscopy Imaging for Biosciences, 2018 ed, April 9th-13th 2018, i3S - Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Portugal

Summer School in Advanced Scientific Computing, June 20th-23th 2016, Informatics Department, School of Engineering, University of Minho, Braga, Portugal

Introduction to Next-Generation Sequencing Data and Analysis, June 23th-26th 2015, CIBIO-inBIO, Vairão, Portugal

Edinburgh Summer School in Integrative Computational Neuroscience, August 26th – September 2nd 2012, Institute for Adaptive and Neural Computation, School of Informatics, University of Edinburgh, Scotland

First Portuguese Forum On Computational Biology, July 10th-12th 2008, Instituto Gulbenkian de Ciência, Oeiras, Portugal

Summer School on Mathematics in Biology and Medicine, September 2004, Instituto Gulbenkian de Ciência, Oeiras, Portugal