Miguel Fernandes

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Summary

I am an experienced scientist fascinated by the analysis of data, using AI methods to extract valuable insights. Aiming to empower people through knowledge!

Experience

Head of the Image and Data Analysis Facility (IDAF) / Data Scientist

German Center for Neurodegenerative Diseases (DZNE)

Mar 2021 - Present (6 months +)

The Image and Data Analysis Facility (IDAF) provides service and support for all issues related to image analysis, data processing, and statistics:

Data Science
- Deep learning
- Supervised learning (classification)
- Unsupervised learning (clustering)
- Statistical analysis

Software Development
- Python
- ImageJ/Fiji Extensions
- Imaris

Consulting
- How to structure the project to improve data analysis?
- How to analyze the data?

Quantitative Microscopy
- Automated object detection in histological slides and fluorescence microscopy images
- Quantification of calcium imaging data
- Particle tracking in time-series data

Researcher/Data Scientist

Max Planck Institute of Neurobiology

Nov 2020 - Feb 2021 (4 months)

Laboratory of Prof. Dr. Herwig Baier.

Together with a diverse team of biologists, biochemists, computational scientists, and physicists I created and improved analytical and experimental approaches to investigate questions ranging from molecular to behavioral neuroscience.

Projects:

• I developed computational approaches (e.g. using dimensionality reduction and clustering) for the analysis and visualization of transcriptomics datasets (single-cell RNA sequencing) to find biomarkers for particular classes of neuronal cells involved in visual perception.

• To reveal insights from multidimensional brain imaging data and behavioral recordings I devised automatized and customized machine learning pipelines (e.g. linear regression, logistic regression, K-means, and hierarchical clustering)

• To target neuronal cells, I developed new transgenic sensors and actuators using molecular biology tools (e.g. CRISPR-Cas9 genome editing, intersectional genetic approaches)

• In addition, I established and maintained advanced imaging technologies (Two-Photon Optogenetics by Computer-Generated Holography) to selectively manipulate cellular function.

Research Scientist

Max Planck Institute of Neurobiology

Sep 2013 - Oct 2020 (7 years 2 months)

As a Neuroscientist, I used several methods, including high-resolution behavioral tracking, neuronal imaging, molecular and machine learning approaches to study decision-making in zebrafish.

• Employed diverse machine learning algorithms to unstructured data.

• Modelled and analyzed behavioral and imaging data using supervised and unsupervised learning algorithms (e.g. linear regression, K-means, and hierarchical clustering).

• Performed high-resolution behavioral tracking. Video recording and object tracking using Computer Vision (OpenCV).

• Analyzed 3D biological data. Max Planck high-performance computing facility (Linux clusters). Bash, CMTK, ANTs, and Image J Macro scripts.

• Imaged neuronal activity combined with Holographic optogenetic stimulation (2P Microscopy).

Teaching

Graduate School of Systemic Neurosciences - LMU Munich

Jun 2018 - Jun 2018 (1 month)

Course Tutor (theory and practical course)

Molecular neurobiology course (GSN-LMU)

"Molecular and behavioral approaches for neuronal circuit analysis in zebrafish"

Teaching

Graduate School of Systemic Neurosciences - LMU Munich

Jul 2017 - Jul 2017 (1 month)

Course Tutor (theory and practical course)

Molecular neurobiology course (GSN-LMU)

"Molecular and behavioral approaches for neuronal circuit analysis in zebrafish"

Workshop Instructor

Technical University of Munich

Jan 2015 - Jan 2015 (1 month)

"Introduction to zebrafish as a model system"

Zoology department

Visiting researcher

National Institute of Genetics, Japan

May 2014 - May 2014 (1 month)

NIG Collaboration Grant-NIG-JOINT (2014-A).

Laboratory of Prof. Dr. Koichi Kawakami.

"High-throughput screening of Gal4 enhancer and gene trap lines".

Doctor of Philosophy in Neuroscience, PhD

University of Freiburg

Apr 2009 - Aug 2013 (4 years 5 months)

Laboratory of Prof. Dr. Wolfgang Driever. Developmental Biology Unit, Department of Biology I.

During my PhD I worked on the development and function of hypothalamic neurons using molecular, behavioral and confocal imaging approaches.

Awarded the Hans-Grisebach Award, honor issued by the University of Freiburg for the outstanding dissertation in the field of biochemistry and molecular biology in 2014.

• Performed Confocal imaging of in vivo and in vitro brain samples.

• Developed molecular and transgenetic tools for neural circuit dissection: pharmacogenetic ablation of cells, large genomic and RNA data analysis, DNA/RNA handling, PCR, and molecular cloning.

• Constructed behavioral setups and analyzed time-series data.

• Performed Immunohistochemistry and Fluorescent in situ Hybridization techniques

Visiting Researcher

Unit on Behavioral Neurogenetics, NICHD

Jan 2011 - Feb 2011 (2 months)

Laboratory of Dr. Harold Burgess.

"High-throughput behavioral analysis in zebrafish".

Research assistant

Developmental Biology Unit, Department of Biology I, University of Freiburg

Oct 2008 - Mar 2009 (6 months)

Laboratory of Prof. Dr. Wolfgang Driever.

Diploma thesis (practical scientific project)
Institute of Human Genetics, University of Freiburg, Germany
Mar 2008 - Sep 2008 (7 months)
Title: “Comparative DAZ and CDY mapping discloses recurrent rearrangements on Y chromosomes of the common chimpanzee.”
Thesis Advisor: Dr. Werner Schempp

Licentiate Degree, Biology (equivalent to Master's degree)
Universidade do Porto
2003 - 2008 (6 years)

Education

The University of Freiburg
Doctor of Philosophy - PhD, Neuroscience
2008 - 2013

University of Porto
Licentiate degree (equivalent to Master's degree), Biology, General
2003 - 2008
Equivalent to Master

Licenses & Certifications

Machine Learning with Python - Coursera
STWHQJZAUFHV

Databases and SQL for Data Science - Coursera
P6H52D9GEVQ7

Skills

Python • Life Sciences • Machine Learning • Neuroscience • Molecular Biology • Big Data • Genetics • Data Science • Statistics • Artificial Intelligence (AI)

Honors & Awards

Hans-Grisebach Award 2014 - University of Freiburg
2014
Outstanding dissertation in the field of biochemistry and molecular biology