# Hamed Rabiei

*Biomedical Data Scientist*

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in *hamed-rabiei*

## Personal information

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|---|---|
| Date of birth | 22/09/1984 |
| Sex | Male |
| Nationality | French-Iranian |
| Marital status | Married |

## Education

2014-2017 **PhD in Applied Mathematics, Medical Image Analysis**, *Institute of Mathematics (I2M) and Institute of Neuroscience of Timone (INT), Aix-Marseille University*, Marseille, France.

2007-2009 **MS in Applied Mathematics, Numerical Analysis**, *Iran University of Science and Technology*, Tehran, Iran.
GPA: 17.34/20

2002-2006 **BA in Applied Mathematics**, *Shahrood University*, Shahrood, Iran.
GPA: 15.73/20

## Work experiences

### Data Scientist

2021–present **B&A Biomedical**, Marseille.

- Designed the statistical and machine learning analysis protocol for the **Pelargos project** (development and validation phases), contributing to successful fundraising, presenting the project to hospitals to secure clinical participation, and implementing the eCRF in compliance with GDPR, data security, and patient confidentiality regulations; ongoing project.
- Provided image processing and machine learning pipelines for the **LyGorithm project**, in collaboration with Timone University Hospital, to classify brain tumors from MRI; manuscript in preparation.
- Led a precision medicine project, analyzing data from a failed Phase 3 clinical trial to **identify patient subgroups** responding to Bumetanide for ASD symptom improvement; manuscript submitted.

2018–2021 **Neurochlore**, Marseille.

- Contributed to multiple projects analyzing rodent brain microscopy images, including the development of the **IBen 3D atlas of the developing mouse brain**, with results published in *NeuroImage*, *Science Advances* and other journals.
- Designed and implemented the statistical and machine learning pipelines for the **Pelargos project** (proof-of-concept phase), predicting ASD in newborns; results published in *Nature Scientific Reports*.
- Designed and implemented a U-Net based deep learning pipeline for automatic segmentation of rodent brain tissues.
- Applied image analysis, 3D brain surface reconstruction, and statistical modeling across several neuroscience research projects.

### Supervision

2021 **Internship supervisor**, *Master student (2nd year)*, Aix-Marseille University & Neurochlore.

2017 **Internship supervisor**, *Bachelor students (3rd year)*, Aix-Marseille University.

### Research Assistant

2009–2013 **Approximation of eigenvalues of differential equations**, *under supervision of Professor Ahmad Golbabai at Iran University of Science and Technology*, Tehran, Iran.

### Instructor

2/2011–1/2013 **Engineering Mathematics**, *Iran University of Science and Technology*, Tehran, Iran.

2/2011–7/2011 **Calculus II**, *Allameh Tabatabai University*, Tehran, Iran.

6/2011–9/2011 **Applied Mathematics**, *University of Applied Science and Technology*, Tehran, Iran.

### Teaching Assistant

9/2012–1/2013 **Advanced Numerical Analysis**, *Iran University of Science and Technology*, Tehran, Iran.
This is a graduate course for master students of Applied Mathematics.

9/2009–1/2011 **Engineering Mathematics**, *Iran University of Science and Technology*, Tehran, Iran.

9/2009–1/2010 **Calculus II**, *Iran University of Science and Technology*, Tehran, Iran.

2/2004–7/2006 **Computer Programming**, *Shahrood University*, Shahrood, Iran.

9/2004–1/2005 **Statistics and Probability**, *Shahrood University*, Shahrood, Iran.

## Work skills

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|---|---|---|---|
| Data analysis | Python packages for statistical analysis and machine learning | Other | Git, C, Swift, Matlab |
| Image processing | BrainVISA, Ilastik, ImageJ, Meshlab, elastix, OpenCV | | |
| Platforms | Linux, macOS, Windows | Tools | LaTeX, MS Office, Inkscape, Mendeley |

## Languages

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|---|---|---|
| Persian | Fluent | *My native language* |
| English | Advanced | *Speaking, reading, and writing* |
| French | Advanced | *Speaking, reading, and writing* |

## PhD research

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|---|---|
| Title | *Spectral Shape Analysis of the Human Cerebral Cortex Complexity* |
| Supervisors | Dr. Olivier Coulon; Dr. Julien Lefèvre; Dr. Frédéric Richard |
| Description | My PhD research is about quantification of cortical fold shapes. Specially, we developed spectral methods based on the Laplace-Beltrami spectrum to measure the complexity of the human brain surface. |

## Publications

On Google scholar

### Journals

2022 B. Riffault, R. Cloarec, **H. Rabiei**, M. Begnis, D. C. Ferrari, and Y. Ben-Ari, *A quantitative cholinergic and catecholaminergic 3D Atlas of the developing mouse brain*, Neuroimage, vol. 260, pp. 119494. *(IF: 4.5)*

2021 M. Chiesa, **H. Rabiei**, B. Riffault, D. C. Ferrari, and Y. Ben-Ari, *Brain Volumes in Mice are Smaller at Birth After Term or Preterm Cesarean Section Delivery*, Cerebral Cortex, vol. 31, no. 8, pp. 3579–3591. *(IF: 2.9)*

2021 H. Caly, **H. Rabiei**, P. Coste-Mazeau, S. Hantz, S. Alain, J.-L. Eyraud, T. Chianea, C. Caly, D. Makowski, N. Hadjikhani, E. Lemonnier, and Y. Ben-Ari, *Machine learning analysis of pregnancy data enables early identification of a subpopulation of newborns with ASD*, Scientific Reports, vol. 11, no. 1, pp. 1–14. *(IF: 3.9)*

2021 **H. Rabiei**, O. Coulon, J. Lefèvre, and F. Richard, *Surface Regularity via the Estimation of Fractional Brownian Motion Index*, IEEE Transactions on Image Processing, vol. 30, pp. 1453–1460. *(IF: 13.7)*

2019 R. Cloarec, B. Riffault, A. Dufour, **H. Rabiei**, L.-A. Gouty-Colomer, C. Dumon, D. Guimond, P. Bonifazi, S. Eftekhari, N. Lozovaya, D. C. Ferrari, Y. Ben-Ari, *Pyramidal neuron growth and increased hippocampal volume during labor and birth in autism*, Science Advances, vol. 5, no. 1, pp. eaav0394. *(IF: 12.5)*

2017 **H. Rabiei**, F. Richard, O. Coulon, and J. Lefèvre, *Local spectral analysis of the cerebral cortex: new gyrification indices*, IEEE Transactions on Medical Imaging, vol. 36, no. 3, pp. 838–848. *(IF: 3.94)*

2015 A. Golbabai, E. Mohebianfar, and **H. Rabiei**, *On the new variable shape parameter strategies for radial basis functions*, Computational and Applied Mathematics, vol. 34, no. 2, pp. 691–704, 2015. *(IF: 0.96)*

2012 A. Golbabai and **H. Rabiei**, *A meshfree method based on radial basis functions for the eigenvalues of transient Stokes equations*, Engineering Analysis with Boundary Elements, vol. 36, no. 11, pp. 1555–1559, 2012. *(IF: 1.72)*

2012 A. Golbabai and **H. Rabiei**, *Hybrid shape parameter strategy for the RBF approximation of vibrating systems*, International Journal of Computer Mathematics, vol. 89, no. 17, pp. 2410–2427, 2012. *(IF: 0.97)*

### Book Chapters

2019 **H. Rabiei**, F. Richard, O. Coulon, and J. Lefèvre, *Estimating the complexity of the cerebral cortex folding with a local shape spectral analysis*, in Vertex-Frequency Analysis of Graph Signals. Signals and Communication Technology, Springer, Cham, pp. 437–458.

### Conferences and workshops

2018 **H. Rabiei**, F. Richard, O. Coulon, and J. Lefèvre, *Hurst Parameter Estimation of Fractional Brownian Surfaces*, SIAM Conference on Imaging Science, Accepted as an oral presentation.

2016 **H. Rabiei**, F. Richard, O. Coulon, and J. Lefèvre, *Spectral shape analysis of the human brain surface*, poster presentation in SIGMA'2016 Workshop, CIRM, Marseille, France, 2016.

2016 A. Pepe, **H. Rabiei**, J. Tohka, I. Dinov, J. Lefèvre, *Modelling growth and tangential expansion in the brain surface: a practical framework*, conference abstract: OHBM2016, Geneva, Switzerland, 2016.

2015 **H. Rabiei**, F. Richard, M. Roth, J.-L. Anton, O. Coulon, and J. Lefèvre, *The graph windowed Fourier transform: a tool to quantify the gyrification of the cerebral cortex*, oral presentation in Workshop on Spectral Analysis in Medical Imaging, MICCAI Conference, Münich, Germany, 2015.

2011 A. Golbabai, **H. Rabiei**, and E. Mohebianfar, *RBF approximation for the eigenvalues of the Stokes Equations*, Proceeding of the 42nd Annual Iranian Mathematics Conference, pp. 972–975, 2011.

2011 A. Golbabai, E. Mohebianfar, and **H. Rabiei**, On the eigenvalues of integral equations using a meshless method based on radial basis functions, Proceeding of the 6th Seminar on Linear Algebra and its Applications, pp. 91–95, 2011.

## Interests

App dev iOS application development for iPhone

Hiking My lifelong sport

Bicycling A fun alternative to running

Books History and Biography

## References

**Professor Yehezkel Ben-Ari**
Neurochlore
Marseille 13009
✉ ben-ari@neurochlore.fr

**Professor Olivier Coulon**
Institut de Neurosciences de La Timone
Aix-Marseille Université
Marseille 13005
✉ olivier.coulon@univ-amu.fr

**Professor Frédéric Richard**
Institut de Mathématiques de Marseille
Aix-Marseille Université
Marseille 13453
✉ frederic.richard@univ-amu.fr

**Dr. Julien Lefèvre**
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