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Education

Brown University   **Providence, RI ● 2016 – 2021**
- PhD. in Computer Engineering, MSc. in Applied Mathematics (*GPA: 4.0*)
- *Research Focus:* Discrete Optimization for Image Segmentation and Clustering
- *Adviser:* Pedro F. Felzenszwalb.

University of Nice-Sophia Antipolis   **Sophia-Antipolis, France ● 2014 – 2015**
- MSc. in Computer Science, *with Honors*
- *Supervisor:* Marc Antonini.

Federal University of Ceará   **Fortaleza, Brazil ● 2011 – 2015**
- BEng. in Telematics Engineering, *Magna cum Laude*
- *Supervisor:* Fátima N. Sombra de Medeiros.

Work Experience

Computer Science Department at Bowdoin College, Assistant Professor   **Brunswick, ME ● 2023 –**

Computer Science Department at Haverford College, Visiting Assistant Professor   **Haverford, PA ● 2021 – 2023**
- Taught the introductory courses to Computer Science (Intro to Programming and Data Structures) ● Taught a course in Deep Learning for Computer Vision ● Co-taught Foundations of Data Science and Machine Learning.
- Advised more than 15 undergraduate students (from freshmen to seniors) in research projects in the areas of biomedical image segmentation, clustering, spectral image segmentation, topic modeling for computer vision, and unsupervised deep learning.
- Participated on a multidisciplinary NSF funded research project on the perception of GAN-generated faces, led by Profs. Ryan Lei (Psychology) and Alvin Grissom (CS) ● Acted as the computer vision expert and advised the undergraduate members.

Laboratory for Engineering Man/Machine Systems (LEMS), Research Assistant   **Providence, RI ● 2016 – 2021**
- Developed two algorithms to unsupervisedly estimate the color distributions in the regions of an image and use them to efficiently segment it using Graph-cuts ● Developed the connection between the problem of Topic Modeling and Image Segmentation.
- Proposed a multi-view spectral image segmentation algorithm that incorporates long range relationships for global appearance modeling ● The method provided a natural interpretation for the cut criteria and was able to greatly outperform traditional spectral segmentation methods.
- Generalized the Normalized Cuts Algorithm to leverage expert segmentation information via a penalty function
- Worked on new ADMM-based optimization algorithms for hypergraph clustering to and subspace clustering.

Informatics, Signals and Systems Laboratory (I3S), Research Assistant   **Sophia Antipolis, France ● 2014 – 2015**
- Studied 3D and 2D/3D shape descriptors for view-based indexing and retrieval of 3D meshes ● Proposed the application of learning algorithms such as boosting and SVMs to classify 3D models using these descriptors

Vision, Images and Signals Laboratory (LABVIS), Research Assistant   **Fortaleza, Brazil ● 2013 – 2014, 2015 – 2016**
- Designed several algorithms to SAR image segmentation using the statistical information extracted directly from the images ● Published three journal papers on these findings.
- Designed a novel level set algorithm for image segmentation ● Presented it in one of the main computer vision conferences (ICIP).
- Worked on new algorithms for biomedical image segmentation (cervical cell and fundus images, specifically) and for improving shape retrieval tasks with applications to in healthcare datasets ● Published the results in journal and conferences papers.

Teaching & Advising Experience

Teaching

Deep Learning for Computer Vision (CS3485), Main Instructor   **Bowdoin College ● Fall 2023-2024, Spring 2025**

Introduction to Computer Science (CS1101), Main Instructor   **Bowdoin College ● Spring 2024**

Artificial Intelligence (CS2400), Main Instructor   **Bowdoin College ● Fall 2024, Spring 2025**

Deep Learning for Computer Vision (CS396), Main Instructor and Course Designer   **Haverford College • Fall 2022**
- Designed to cover the most recent Deep Learning solutions to Computer Vision, going from image classification, object detection, segmentation, denoising and image generation. • Fully designed in PyTorch with accompanying explanatory IPython notebooks.

Data Structures (CS106), Main Instructor and Course Designer   **Haverford College • Spring 2022-2023**
- Designed in Java, it covered Object Oriented Programming the the traditional data structures (lists, queues, stacks, graphs, hashing, etc.). • The course received praise from the department and students.

Machine Learning (CS360), Co-Instructor   **Haverford College • Spring 2022**

Introduction to Computer Science (CS105), Main Instructor   **Haverford College • Fall 2021-2022**
- Designed in Python, the foundations of computer science to students without prior experience in programming • Covered variables, conditional statements, loops, file management, exception handling and Numpy.

Foundations of Data Science (CS260), Co-Instructor   **Haverford College • Fall 2021**

Artificial Intelligence and Deep Learning, Instructor and Course Designer   **Brown University • Summer 2019**
- Designed and taught course on Deep Learning entirely designed to high-schoolers with none or very little background on Calculus and Algebra • The class had a duration of 60h and included homeworks and class assignments on Jupyter/IPython.

Introduction to Matlab, Instructor and Course Designer   **Federal University of Ceará • Jan – Feb 2013**
- Short course (16 h) on the basics of Matlab and its applications in engineering • The course content and materials, which included a 90-page long Matlab tutorial in Portuguese written in LaTeX (link to download), were compiled by me specially for this class.

Linear Systems (ENGN 1570), Teaching Assistant   **Brown University • Fall 2020**

Machine Learning and Pattern Recognition (ENGN 2520), Teaching Assistant   **Brown University • Spring, 2019**

Research Advising and Metoring

Undergraduate and Masters Research Projects, Research Advisor

- Joram Kim   Bowdoin College • Summer 2025
  Implicit Neural Representations for Model Interpretability and Unsupervised Image Segmentation

- Shahd Hekal   Bowdoin College • Summer 2025
  JaSIN: A Self-Regularized ReLU Variant for High-Performance Image Reconstruction via Implicit Neural Representations

- Richard Lim   Bowdoin College • Summer 2025
  A Language Model for Expressiveness in American Sign Language

- Vaishali Miriyagalla   Bowdoin College • Spring 2025
  Data Analysis and Computer Vision on Squash Games

- Abhi Nagireddygari   Bowdoin College • Fall 2024 – Spring 2025
  Data Analysis and Computer Vision on Squash Games

- Alexander Richardson   Bowdoin College • Fall 2024 – Spring 2025
  Spectral Attention by Unrolling Principal Component Analysis

- Brian Liu   Bowdoin College • Fall 2024 – Spring 2025
  Measuring Multidimensiona Poverty from Satellite Data and Points of Interest

- Louisa Linkas   Bowdoin College • Summer 2024
  Understand the Impact of Climate Change on Costal Maine Using Satellite Data

- Justas Bardauskas   Bowdoin College • Summer 2024
  Design a Software to Efficiently Scrape and Strore Satellite Images and Points of Interest

- Ulemj Munkhtur   Bowdoin College • Summer 2024
  Clustering Data using Unsupervised Deep Neural Networks

- Mingi Kang   Bowdoin College • Summer 2024 - Spring 2026
  ConvNN: Attention via Convolutional Nearest Neigbors

- Kavi Sarna   Bowdoin College • Spring 2024 – Spring 2025
  Generalized Squeeze-and-Excitation Networks

- Jack Roberts   Bowdoin College • Spring 2024 – Spring 2025
  Studying the Effect of Adding Superpixel Information to the U-Net for Image Segmentation.

- Ben Bockman   Bowdoin College • Spring 2024 – Summer 2025 - Spring 2025
  CNNs for Predicting Poverty Rates using Satellite Imagery.

- Yonas Gebregziabher — Bowdoin College • Spring 2024
  Creating an Online Environment to Teach Deep Learning on the Google Cloud Platform.
- William Warlick — Bowdoin College • Spring 2024
  Measuring Shot Put Distances using 3D vision.
- Wahub Ahmed — Haverford College • Spring 2024
  Using the Information Theoretic Bottleneck Principle in GANs.
- Olivia Wirsching — Bowdoin College • Fall 2023
  GANs for Art Restoration.
- Cassandra Goldberg — Bowdoin College • Fall 2023 – Spring 2024
  Statically sound Deep Learning Approaches to SAR Image Segmentation.
- Ahmed Haj and Mohammad Fanous — Haverford College • Summer 2022
  Majorization-Minimization for Superpixel-based Unsupervised Image Segmentation.
- Issac Wasserman — Haverford College • Fall 2022 – Spring 2023
  Patch-based Deep Unsupervised Image Segmentation with Graph Cuts.
- Dylan Soemitro — Haveford College • Fall 2022 – Spring 2023
  A Novel Spectral Clustering Algorithm for Mixed/Heterogeneous Data.
- Yiting Zou — Haveford College • Fall 2022 – Spring 2023
  Using Topic Modeling Strategies for Image Segmentation.
- Sam Silverman, Julia Curran and Angelina Geralis — Haverford College • Fall 2022 – Spring 2023
  Using Data Science to Predict Soccer Matches Outcomes and Player Performance.
- Li Fan — Haverford College • Fall 2022 – Spring 2023
  Parameter Estimation for the $\mathcal{G}_I^0$ Distribution Using Deep Learning.
- Joseph Tadrous — Haveford College • Fall 2022
  Literature Review on Deep Learning Methods For Semantic Image Segmentation.
- Adiel Benisty — Haveford College • Summer, 2022
  Derivative-free Optimization with Graph-Cuts.
- Ivy Xie and Ellie Hughes — Haveford College • Summer, 2022
  Literature Review on Deep Learning Methods For Saliency Detection.
- Olufemi Obiwumi — Haveford College • Spring, 2022
  Estimating Coherent Appearance Models for Segmentation using Non-Negative Matrix Factorization.
- Jacob Zimmerman — Haverford College • Fall, 2021 – Spring, 2022
  Global Modeling for Noise2void-Based Deep Unsupervised Image Restoration.
- Rahul Palnitkar — Haverford College • Fall, 2021 – Spring, 2022
  New Sparse Graphs with Global Modeling for Spectral Image Segmentation.
- Frederick Gould — Haverford College • Fall, 2021 – Spring, 2022
  Graph-cut based K-means formulation for Image Segmentation.
- Keeton Martin — Haverford College • Fall, 2021
  Using Deep Learning to Estimate Item Response Theory Parameters.
- Iryna Khovryak — Haverford College • Fall, 2021
  Leveraging Graph Structure in Fundus Images for Blood Vessel Segmentation using Graph Neural Networks.
- Pedro Polanco — Brown University • Summer, 2020 – Spring, 2021
  Unsupervised Deep Image Segmentation with Gaussian Processes.

Direct Reading Program in Applied Math, Mentor — **Brown University • Spring, 2019 – Fall, 2020**

- Advised undergraduate research projects on topics related to the mathematical foundations of Deep Learning.

Other

The Sheridan Teaching Seminars, Certified Participant — **Brown University • 2020 – 2021**

- Received teaching certificates on Reflective Teaching (I) and Course Design (II) from Brown's Sheridan Center for Teaching and Learning. These intensive programs certificates recognize one's ability to develop their teaching practice in order to support diverse learners (I), while developing professional and inclusive courses' syllabi (II).

Publications

Co-authors whose contribution took place as undergraduate students are <u>underlined</u>

Preprint

[3] Goldberg, Cassandra and **J. F. S. R. Neto**, *A parameter estimation-inspired convolutional block for sar data*, To appear at IEEE International Geoscience and Remote Sensing Symposium, 2025.

[6] Dylan Soemitro and **J. F. S. R. Neto**, *Spectral clustering of categorical and mixed-type data via extra graph nodes*, 2024. arXiv: 2403.05669.

[9] A. Grissom, R. F. Lei, **J. F. S. R. Neto**, Yikang Lin, and Ryan Trotter, *Examining pathological bias in a generative adversarial network discriminator: A case study on a stylegan3 model*, Under review at npj Artificial Intelligence, 2024. arXiv: arXiv:2402.09786.

[20] **J. F. S. R. Neto** and P. F. Felzenszwalb, *Spectral image segmentation with global appearance modeling*, 2020. arXiv: 2006.06573.

Journal Papers

[2] Fan, Li and **J. F. S. R. Neto**, "Using traditional and bayesian neural networks for fast parameter estimation in sar images," *Pattern Recognition Letters*, 2025.

[10] Gusdorff, Matthew, A. Grissom, **J. F. S. R. Neto**, Lin, Yikang, Trotter, Ryan, and R. F. Lei, "Considering how machine-learning algorithms (re) produce social biases in generated faces," *Social and Personality Psychology Compass*, vol. 18, no. 11, e70021, 2024. PsyArXiv: https://osf.io/preprints/psyarxiv/nh9qm_v1.

[11] **J. F. S. R. Neto**, "Appearance estimation and image segmentation via tensor factorization," 2024, To appear at IEEE Open Journal of Signal Processing. arXiv (longer version): 2208.07853.

[14] **J. F. S. R. Neto** and F. A. A. Rodrigues, "Improving log-cumulant-based estimation of heterogeneity information in sar imagery," *IEEE Geoscience and Remote Sensing Letters*, Ago 2023.

[16] **J. F. S. R. Neto**, P. F. Felzenszwalb, and M. Vazquez, "Direct estimation of appearance models for segmentation," *SIAM Journal on Imaging Sciences*, vol. 15, no. 1, pp. 172–191, 2022.

[17] F. H. D. Araújo, R. R. V. Silva, F. N. S. Medeiros, **J. F. S. R. Neto**, P. H. C. Oliveira, A. G. C. Bianchi, and D. Ushizima, "Active contours for overlapping cervical cell segmentation," *International Journal of Biomedical Engineering and Technology*, Jan. 2021.

[18] A. M. Braga, R. C. Marques, F. N. Medeiros, J. F. R. Neto, A. G. Bianchi, C. M. Carneiro, and D. M. Ushizima, "Hierarchical median narrow band for level set segmentation of cervical cell nuclei," *Measurement*, p. 109 232, 2021.

[21] A. C. Carneiro, J. G. Lopes, M. M. Souza, **J. F. S. R. Neto**, F. H. Araújo, R. R. Silva, F. N. Medeiros, and F. N. Bezerra, "Parameter optimization of a multiscale descriptor for shape analysis on healthcare image datasets," *Pattern Recognition Letters*, Jun. 2019.

[22] **J. F. S. R. Neto**, A. M. Braga, R. C. P. Marques, and F. N. S. Medeiros, "Level-set formulation based on an infinite series of sample moments for sar image segmentation," *IEEE Geoscience and Remote Sensing Letters*, Sep. 2019.

[25] L. C. Neto, G. L. B. Ramalho, **J. F. S. R. Neto**, R. M. S. Veras, and F. N. S. Medeiros, "An unsupervised coarse-to-fine algorithm for blood vessel segmentation in fundus images," *Expert Systems with Applications*, Feb. 2017.

[26] R. H. Nobre, F. A. A. Rodrigues, R. C. P. Marques, J. S. Nobre, **J. F. S. R. Neto**, and F. N. S. Medeiros, "SAR image segmentation with renyi's entropy," *IEEE Signal Processing Letters*, Nov. 2016.

[27] F. A. A. Rodrigues, **J. F. S. R. Neto**, R. C. P. Marques, F. N. S. de Medeiros, and J. S. Nobre, "SAR image segmentation using the roughness information," *IEEE Geoscience and Remote Sensing Letters*, Feb. 2016.

Peer Reviewed Conference Papers

[4] <u>Isaac Wasserman</u> and **J. F. S. R. Neto**, "Patch-based deep unsupervised image segmentation using graph cuts," in *2025 International Conference on Computer Vision Theory and Applications (VISAPP)*, 2025, **Best Paper Award**. arXiv: 2311.01475.

[7] Fan, Li and **J. F. S. R. Neto**, "Using neural networks for fast roughness estimation in sar images with scarce data," in *IEEE 37th SIBGRAPI Conference on Graphics, Patterns and Images (SIBGRAPI)*, 2024, **Best Paper Award Runner up**. arXiv: 2309.03351.

[12] Palnitkar, Rahul and **J. F. S. R. Neto**, "A sparse graph formulation for efficient spectral image segmentation," in *2024 IEEE International Conference on Image Processing (ICIP)*, IEEE, 2024, pp. 1410–1416.

[23] A. C. Carneiro, J. G. F. Lopes, **J. F. S. R. Neto**, M. M. S. Souza, and F. N. S. Medeiros, "On the evaluation of cost functions for parameter optimization of a multiscale shape descriptor," in *IEEE Symp. on Signal Process. and Inf. Technol. (ISSPIT)*, Feb. 2017.

[24] **J. F. S. R. Neto**, A. M. Braga, F. N. S. Medeiros, and R. C. P. Marques, "Level-set formulation based on Otsu method with morphological regularization," in *IEEE International Conference on Image Processing (ICIP)*, Sep. 2017.

Posters

[1] Abhi Nagireddygari and **J. F. S. R. Neto**, "Extracting & analyzing squash match patterns using a low-cost computer vision framework," in *2025 Connecticut Sports Analytics Symposium*, 2025, **3rd Place Best Poster Award**.

[8] Goldberg, Cassandra and **J. F. S. R. Neto**, "Statistically principled deep learning for sar image segmentation," in *Proceedings of the AAAI Conference on Artificial Intelligence*, vol. 38, 2024, pp. 23742–23743.

[15] Matthew Gusdorff, A. G. II, **J. F. S. R. Neto**, and R. F. Lei, "Considering social biases in the creation of computer-generated faces," in *2023 Annual Convention of The Society for Personality and Social Psychology* (*SPSP*), 2023.

In Preparation

[5] R. Nobre, F. Rodrigues, **J. F. S. R. Neto**, J. Nobre, and F. Sombra, "Sar image segmentation using logarithmic expectation information," 2025.

[13] **J. F. S. R. Neto**, "Assisted normalized cuts," 2023.

Thesis

[19] **J. F. S. R. Neto**, "New model-based algorithms for image segmentation," PhD's Thesis, Brown University, 2021.

[28] ——, "SAR image segmentation using level-sets," Bachelor's Thesis, Federal University of Ceará, 2015.

[29] ——, "View-based indexing and retrieval of 3D meshes using machine learning," University of Nice Sophia Antipolis, 2015.

Academic Service & Engagement

Talk

- "*Penalized Normalized Cuts*" at Joint Mathematics Meetings 2022 — Seattle, Apr 2022
- "*Penalized Normalized Cuts*" at IACS, Harvard University 2022 — Boston, Mar 2022
- "*Bias in AI-Generated Faces* " at Faculty Seminar, Bowdoin College 2022 — Brunswick, Mar 2024

Peer-reviewer

- Journal – *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* — 2016–
- Journal – *International Journal of Computer Vision* — 2020–
- Journal – *Artificial Intelligence Review* — 2020–
- Journal – *IEEE Transactions on Pattern Analysis and Machine Intelligence* — 2021–
- Journal – *ISPRS Journal of Photogrammetry and Remote Sensing* — 2022–
- Conference – *Winter Conference on Applications of Computer Vision* (*WACV*) — 2023, 2024
- Conference – *European Conference of Computer Vision* (*ECCV*) — 2024
- Conference – *Asian Conference of Computer Vision* (*ACCV*) — 2024
- Conference – *Conference on Computer Vision and Pattern Recognition* (*CVPR*) — 2025
- Journal – *Computer Vision and Image Understanding* — 2025

Memberships

- Sigma Xi Scientific Research Honor Society (*Associate Member*, earned by nomination) — Jun, 2019 –
- Society for Industrial and Applied Mathematics - SIAM — Jan, 2019 –
- Institute of Electrical and Electronics Engineers - IEEE — May, 2025 –

Workshop Organization / Participation

- Computer Vision Semester Program at ICERM (*Attended*) — Spring, 2019
- Undergraduate Workshop on Scientific Writing (*Organizer*) — Oct, 2013 • Mar, 2014 • Oct 2014 • Oct, 2015

Other

- Applied Math/ICERM Machine Learning Journal Club (*Co-organizer*) — Jan, 2019 – Mar, 2020
- 2021 Brazil Conference at Harvard & MIT (*Staff Member and Co-organizer*) — Oct, 2020 – Jun, 2021

Awards

Prize

- Sigma Xi Prize (excellence in research in Electrical Sciences and Computer Engineering at Brown U.) — 2018

Scholarships and Grants

- Brown University's School of Engineering Graduate Fellowship — 2016 –
- BRAFITEC (*Brésil-France Ingénierie et Technologie*) Full Scholarship for Masters studies in France — 2014 – 2015

○ CNPq (Brazilian National Agency for Scientific Research, in Portuguese) Research Grant   2013 – 2014

Academic Olympiads...

○ Brazilian National Olympiad of Physics   2008, 2009, 2010 (Bronze Medal).
○ Brazilian National Olympiad of Informatics   2009 (Bronze Medal).
○ Brazilian National Olympiad of Astronomy   2007, 2008 (Gold medal); 2006, 2009 (Silver medal).
○ Brazilian National Olympiad of Robotics   2007 (Bronze medal).

Skills

Languages: Portuguese (*Mother Tongue*), English (*TOEFL Score: 109*), French (*Professional Working Proficiency*)

Technical: Matlab, Python (*Numpy, Scikit-Learn, Keras, TensorFlow, PyTorch*), Java, C++ (*OpenCV*), Git, LaTeX/ *Beamer*

References

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