Jeová Farias Sales Rocha Neto

10 Railroad Ave. 1D, Zip Code: 19041 – Haverford – PA
+1 631 538 8982 • jfariassal@haverford.edu • jeovafarias.github.io • linkedin.com/in/jeova-farias

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 Haverford College, Visiting Assistant Professor **Haverford, PA • 2021 –**

- 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 • The proposed method was able to add global appearance and other segmentation cues, such as seeds, to the original spectral framework.
- 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 (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 and Course Designer **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

- Issac Wasserman — Haverford College • Fall, 2022 – Spring, 2023
  Majorization-Minimization Algorithms for Deep Learning-based Unsupervised Image Segmentation.
- 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 — Haveford College • Fall, 2022 – Spring, 2023
  Using Data Science to Predict Soccer Matches Outcomes and Player Performance.
- Li Fan — Haveford 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.
- Silvia Alemany and Olufemi Obiwumi — Bryn Mawr College and Haveford College • Fall, 2021 – 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

Preprint

[1] **J. F. S. R. Neto**, *Estimating appearance models for image segmentation via tensor factorization*, 2022. eprint: arXiv:2208.07853.

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

Journal Papers

[3] **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.

[6] 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.

[7] 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.

[10] 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.

[11] **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.

[14] 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.

[15] 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.

[16] 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.

Conference Papers

[12] 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.

[13] **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.

In Preparation

[2] **J. F. S. R. Neto**, "Penalized normalized cuts," 2022.

[4] **J. F. S. R. Neto**, F. A. A. Rodrigues, and F. N. S. Medeiros, "Fast roughness estimation in sar images using bayesian statistics for image segmentation," 2022.

[5] R. Palnitkar, **J. F. S. R. Neto**, and P. F. Felzenszwalb, "A sparse graph formulation for fast and interpretable spectral image segmentation," 2022.

Thesis

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

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

[18] ——, "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

Journal Peer-reviewer

- IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing — Jun, 2016

- ISPRS Journal of Photogrammetry and Remote Sensing — May, 2018; Feb, 2022
- International Journal of Computer Vision — Jan, 2020
- Artificial Intelligence Review — Dec, 2020
- IEEE Transactions on Pattern Analysis and Machine Intelligence — May, 2021

Memberships

- Sigma Xi Scientific Research Honor Society (*Associate Member*, earned by nomination) — Jun, 2019 –
- Society for Industrial and Applied Mathematics - SIAM — Jan, 2019 –

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

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

Pedro F. Felzenszwalb
PhD Adviser
Brown University
✉ pff@brown.edu
☎ +1 401 863 1531

Fátima N. S. de Medeiros
Undergraduate Adviser and Research Collaborator
Federal University of Ceara
✉ fsombra@ufc.br
☎ +55 85 3366 9467

David Wonnacott
Teaching Mentor
Haverford College
✉ davew@cs.haverford.edu
☎ +1 714 613 2839

Basilis Gidas
Research Collaborator
Brown University
✉ basilis_gidas@brown.edu
☎ +1 401 863 1480

Francisco Alixandre A. Rodrigues
Research Collaborator
Federal University of Cariri
✉ alixandreavila@yahoo.com.br
☎ +55 88 3221 9763

Alvin Grissom II
Research Collaborator
Haverford College
✉ agrissom@haverford.edu
☎ +1 972 310 4057

Marilyn Vasquez
Research Collaborator
Simpson College
✉ marilyn.vazquez@simpson.edu