Jeová Farias Sales Rocha Neto

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Education

Brown University, PhD in Computer Engineering **Providence, RI • 2016 –**
Research Focus: Discrete Optimization for Image Segmentation and Clustering.
Adviser: Pedro F. Felzenszwalb.

University of Nice-Sophia Antipolis, M. Sc. in Computer Science, *with Honors* **Sophia-Antipolis, France • 2014-2015**
Supervisor: Marc Antonini.

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

Research Experience

Laboratory for Engineering Man/Machine Systems (LEMS), Research Assistant **Providence, RI • 2016 –**

- Worked on new algorithms for clustering in graphs and hypergraphs with application to clustering and subspace clustering • Studied the theoretical connection of these problems to the Max-K-Cut and Max Set Splitting problems • Developed efficient solvers with theoretical guarantees for them.
- 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 methods to directly estimate the image appearances in order to do 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.
- Led a masters research project on spectral image segmentation using Deep Learning based similarity functions • In the project, were able to generalize traditional metrics for pixel similarity to metrics derived from infinitely wide CNNs.

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 • Delivered a C++ / OpenGL executable for industrial use.

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 level set algorithm for general image segmentation problems • Presented this work in one of the main image processing 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

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

- Advised undergraduate students over the course of a semester on topics related to the mathematical foundations Deep Learning.

Research Project for Master Students, Research Advisor **Brown University • Jun – Dec, 2020**

- Advised a Computer Engineering Master Student on a computer vision research project. The focus was on linking Gaussian Processes and Deep Leaning in order to perform Unsupervised Image Segmentation.

Pre Doctorate Mentorship Program, Mentor **Brazilian Student Association (BRASA) • Mar – Dec, 2020**

- Mentored Brazilian undergraduate students applying to PhD programs in the USA.

The Sheridan Teaching Seminar - Reflective Teaching, Attendee **Brown University • Fall, 2020**

- Attended workshops on rhetorical practice, inclusivity and course design. Received the Certificate I from the Sheridan Center.

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.

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

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

Publications

Journal Papers

[2] 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.

[3] **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.

[8] 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.

[9] 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.

[10] 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.

[13] A. M. Braga, R. C. P. Marques, F. N. S. Medeiros, **J. F. S. R. Neto**, A. G. C. Bianchi, and D. M. U. C. M. Carneiro, "Hierarchical median narrow band for level set segmentation of cervical cell nuclei," *Measurement*, "in review".

[14] 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*, "in press".

Conference Papers

[6] 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.

[7] **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.

Preprint

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

In Preparation

[4] **J. F. S. R. Neto** and P. F. Felzenszwalb, "Fast sum of pairs clustering using an semidefine programing formulation," 2019.

[5] **J. F. S. R. Neto**, P. F. Felzenszwalb, and M. Y. Vazquez, "Direct estimation of appearance models for segmentation," 2019.

Thesis

[11] **J. F. S. R. Neto**, "SAR image segmentation using level-sets," Bachelor's Thesis, Federal University of Ceará, 2015.

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

Academic Service & Engagement

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
- International Journal of Computer Vision Jan, 2020
- Artificial Intelligence Review Dec, 2020

Membership

- Sigma Xi Scientific Research Honor Society (*Associate Member*, earned by nomination) Jun, 2019 –

Workshop Organization / Participation

- Computer Vision Workshop at ICERM (*Attended*) — Spring, 2019
- Real Algebraic Geometry and Optimization (*Attended*) — Oct, 2017
- Probabilistic Scientific Computing Workshop at ICERM (*Attended*) — Jun, 2017
- 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*), C++ (*OpenCV, OpenGL, Qt*), Git, LaTeX/ (*Beamer*)

References

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