

# CURRICULUM VITAE

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## 1 Education

- BSc in Electrical Engineering (Electronics), Faculty of Electrical Engineering, Federal University of Pernambuco (UFPE), Recife, PE, Brazil, Dec, 1988.
- MSc in Electrical Engineering (Image Processing), Faculty of Electrical and Computing Engineering, University of Campinas (UNICAMP), Campinas, SP, Brazil, Feb, 1993.
- PhD in Electrical Engineering (Image Processing), Faculty of Electrical and Computing Engineering, University of Campinas (UNICAMP), Campinas, SP, Brazil, Dec, 1996.
- Habilitation (“livre docência”) in Image Processing, Institute of Computing, University of Campinas (UNICAMP), Dec, 2003.

## 2 Academic positions

- Assistant Professor, Institute of Computing, University of Campinas (Feb 1998 to Dec 2003).
- Associate Professor, Institute of Computing, University of Campinas (since Dec, 2003).
- Associate Director, Institute of Computing, University of Campinas (Sep 2006 to Apr 2007).
- Coordinator of the Graduate Program in Computer Science, Institute of Computing, University of Campinas (Jul 2009 to Jun 2011).
- Full Professor, Institute of Computing, University of Campinas (since Aug, 2011).

## 3 Research interests

- Image and video processing and analysis.
- Interactive and model-based image segmentation.
- Medical and biological image analysis.
- Machine learning and pattern recognition.
- Graph algorithms and dynamic programming.
- Volumetric visualization.
- Content-based image retrieval.
- Probabilistic and fuzzy object modeling.
- Image registration.
- Biometrical image analysis.

## 4 Teaching experience

- Introduction to Algorithms and Computer Programming.
- Algorithms, Data Structures, and File Structures.
- 3D Image Processing and Visualization.
- Introduction to Computer Graphics.
- Introduction to Image Processing.
- Machine Learning and Pattern Recognition.
- Image Analysis.
- Image Processing using Graphs.
- Medical Image Visualization.
- Remote sensing image processing.
- Techniques to Automate the Diagnosis of Enteroparasites

## 5 Academic services

- Journals

**Senior Area Editor:** IEEE Signal Processing Letters (2016–). **Associate Editor:** IEEE Signal Processing Letters (2014-2016). **Guest editor:** Pattern Recognition Letters (2008-2010). **Editor:** Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization (2012-). **Editor:** Computerized Medical Imaging and Graphics (2006-2010). **Reviewer:** International Journal of Computer Assisted Radiology and Surgery, International Journal of Pattern Recognition and Artificial Intelligence, Multimedia Systems, IEEE Trans. on Computer Graphics & Applications, Computer Vision and Image Understanding, Pattern Recognition Letters, Pattern Recognition, IEEE Trans. on Medical Imaging, IEEE Trans. on Image Processing, Computer & Graphics, SPIE Optical Engineering, IEEE Trans. on Pattern Analysis and Machine Intelligence, Journal of Mathematical Imaging and Vision, Medical Image Analysis, Visual Computer, Pattern Analysis and Applications Journal, SPIE Electronic Imaging, Graphical Models, International Journal of Information Technology, IEEE Transactions on Information Technology in Biomedicine.

- Funding agencies

**Advisory committee:** São Paulo Research Foundation (FAPESP, since 1998 and in Computer Science Coordinator Committee, since 2014), National Council for Research and Development (CNPq, since 1999), Research Foundation of the Institute Mackenzie (2007–2008), Chilean Government Commission for Scientific and Technological Development (FONDECYT, CONICYT, 2008).

- Conferences

**Program chair:** Conf. on Graphics, Patterns, and Images (20th SIBGRAPI, 2007). **Tutorial chair:** Conf. on Graphics, Patterns, and Images (22nd SIBGRAPI, 2009). **Advisory committee:** Conf. on Graphics, Patterns, and Images (CEGRAPI, 2008-2011), Intl. Symp. Computer Methods in Biomechanics and Biomedical Engineering (CBMME 2018). **WTD chair:** Conf. on Graphics, Patterns, and Images (26th SIBGRAPI, 2013). **Program committee:** SPIE Medical Imaging - Image-Guided Procedures, Robotic Interventions, and Modeling (2008–2015), SPIE Medical Imaging - Image Processing (since 2016), 3DOR (2018), EarthVision, CVPR (2017), CSBC-CTD (2016,2017), CIARP (2016), MICCAI (2015), Vip-Image (2015-2017), CompImage (2014), Intl. Conf. on Computational and Experimental Biomedical Sciences (ICCEBS) in 2013, MICCAI workshop on Bio-Imaging and Visualization for Patient-Customized Simulations in 2013, Intl. Conf. of Computer Analysis of Images and Patterns (CAIP, 2013,2015), Conf. on Graphics, Patterns, and Images (SIBGRAPI, since 2003), International Symposium on Mathematical Morphology (2007), Conference on Information and Knowledge Management (2006,2008), SPIE Intl. Symp. on Multispectral Image Processing and Pattern Recognition (2009), Workshop on Interactive Multimodal Pattern Recognition in Embedded Systems (2011), International Symp. on Visual Computing (Special Track on Computational Bioimaging, 2009).

## 6 Honors and awards

- **Keynote speaker:** 29o. Conf. On Patterns, Graphics, and Images (SIBGRAPI, São José dos Campos, 2016), Conf. on Computational Vision and Medical Image Processing (VIPIMAGE, Tenerife, 2015), International Symposium of Mathematical Morphology (ISMM, Rio de Janeiro, 2007), 26o. Brazilian Colloquium of Mathematics (Rio de Janeiro, 2007), 16th International Conference on Digital Signal Processing (DSP, Santorini, 2009), 15th Iberoamerican Congress on Pattern Recognition (CIARP, São Paulo, 2010). IX Brazilian Workshop of Computer Vision (WVC, Rio de Janeiro, 2013).
- **Research awards:** Academic excellence “Zeferino Vaz” in 2014 by UNICAMP. Best journal paper of 2012 in Pattern Recognition, Academic Excellence in 2006, 2011, 2016 by the Institute of Computing - UNICAMP, Fellowship Grants for Research Productivity since 1999 by the National Council for Research and Development (CNPq), UNICAMP Inventor Award 2011 in the category “Licensed Technology”, and UNICAMP Inventor Award 2012 in the category “Licensed Technology”.
- **PhD thesis and MSc dissertation awards:** the best PhD thesis in 2005 by the Brazilian Computer Society (SBC, student Ricardo Torres), the best MSc dissertation in 2006 by the Institute of Computing - UNICAMP (student Paulo Miranda), the best MSc dissertation in 2008 by the Conf. on Graphics, Patterns, and Images (SIBGRAPI, student Fernanda Andaló), the best PhD thesis in 2009 by the Brazilian Computer Society (SBC, student Felipe Bergo), the best PhD thesis in 2009 by the Conf. on Graphics, Patterns, and Images (SIBGRAPI, student João Paulo Papa), Honorable mention of the best PhD thesis in 2009 on Computer Science by the Coordination for the Improvement of Higher Level -or Education- Personnel

(CAPES, student Felipe Bergo), the second best PhD thesis in 2010 by the Conf. on Graphics, Patterns, and Images (SIBGRAPI, renamed in 2010 as Conference on Graphics, Patterns and Images, student Paulo Miranda), the second best PhD thesis in 2013 by SIBGRAPI (student Jefersson dos Santos), the best PhD thesis in 2015 by SIBGRAPI (student Priscila Saito), the best PhD thesis in 2016 by SIBGRAPI (student Thiago Spina).

- **Conference paper awards:** Honorable mention on short paper (EuroVis 2016). Best results in the MOBIO face recognition competition of the Intl. Conf. on Biometrics (ICB 2013), Honorable mention of the best student paper in 2010 by the Conference on Conference on Graphics, Patterns and Images (SIBGRAPI, student Thiago Spina), the five best papers in 2009 by the XIV Brazilian Remote Sensing Symposium (SBSR), Honorable mention poster award in 1999 by SPIE Medical Imaging.

## 7 Publications

### References

- [1] J. Stegmaier, T.V. Spina, A.X. Falcão, A. Bartschat, R. Mikut, E. Meyerowitz, and A. Cunha. Cell Segmentation in 3D Confocal Images using Supervoxel Merge-Forests with CNN-based Hypothesis Selection. *IEEE Intl. Symp. on Biomedical Imaging (ISBI)*. Washington, DC, USA, April 2018, to appear.
- [2] R. Phellan, T. Lindner, M. Helle, A.X. Falcão, and N.D. Forkert. Robust Cerebrovascular Segmentation in 4D ASL MRA Images. *IEEE Intl. Symp. on Biomedical Imaging (ISBI)*. Washington, DC, USA, April 2018, to appear.
- [3] T.V. Spina, J. Stegmaier, A.X. Falcão, E. Meyerowitz, and A. Cunha. SEGMENT3D: A Web-based Application for Collaborative Segmentation of 3D Images Used in the Shoot Apical Meristem. *IEEE Intl. Symp. on Biomedical Imaging (ISBI)*. Washington, DC, USA, April 2018, to appear.
- [4] K.C. Ciesielski, A.X. Falcão, and P.A.V. Miranda. Path-value functions for which Dijkstra's algorithm returns optimal mapping. *Journal of Mathematical Imaging and Vision*, 2018, to appear.
- [5] B.M. dos Santos, F.A. Soares, S.L. Rosa, D.C.J.F. Gomes, C.T.N. Suzuki, W.B. Nagata, S.H.V. Perri, F.F.T. de Freitas, K.D.S. Bresciani, A.X. Falcão, and J.F. Gomes. A Study of Intestinal Parasites in Children of an Urban Region with Excellent Sanitary Condition Reveals High Occurrence of Blastocystis Spp. *Journal of Tropical Pathology*, doi: 10.5216/rpt.v46i4.51016, 46(4), pp. 321–330, Jan 2018.
- [6] R. Phellan, T. Lindner, M. Helle, A. X. Falcão, and N. D. Forkert. Automatic temporal segmentation of vessels of the brain using 4D ASL MRA images. *IEEE Trans. on Biomedical Engineering*, doi 10.1109/TBME.2017.2759730, 2017, in press.

- [7] S.B. Martins, G. Chiachia, A.X. Falcão. A fast and robust negative mining approach for enrollment in face recognition systems. *The 30th SIBGRAPI - Conference on Graphics, Patterns and Images*, IEEE,doi: 10.1109/SIBGRAPI.2017.33, Niterói, RJ, pp. 201–208, Oct, 2017.
- [8] M.A.T. Condori, F.A.M. Cappabianco, A.X. Falcão, P.A.V. Miranda. Extending the Differential Image Foresting Transform to Root-based Path-cost Functions with Application to Superpixel Segmentation. *The 30th SIBGRAPI - Conference on Graphics, Patterns and Images*, IEEE, Niterói, RJ, pp. 7–14, Oct, 2017.
- [9] R. Phellan, A. Peixinho, A.X. Falcão, and N.D. Forkert. Vascular segmentation in TOF MRA images of the brain using a deep convolutional neural network. *Intravascular Imaging and Computer Assisted Stenting, and Large-Scale Annotation of Biomedical Data and Expert Label Synthesis: 6th Joint International Workshops, CVII-STENT 2017 and Second International Workshop, LABELS 2017, Held in Conjunction with MICCAI 2017, Québec City, QC, Canada*, doi: 10.1007/978-3-319-67534-3\_5, LNCS 10552, pp. 39-46, Sep, 2017.
- [10] P. E. Rauber, A. X. Falcão, and A. C. Telea. Projections as Visual Aids for Classification System Design. *Information Visualization*, doi: 10.1177/1473871617713337, 2017, in press.
- [11] J.E. Vargas, D. Tuia, J.A. dos Santos, and A.X. Falcão. Post Classification Smoothing in Sub-Decimeter Resolution Images with Semi-Supervised Label Propagation. *IEEE Intl. Geoscience and Remote Sensing Symposium (IGARSS 2017)*, 10.1109/IGARSS.2017.8127799, Fort Worth, Texas, USA, pp. 3688-3691, 2017.
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- [13] G.C.S. Ruppert, G. Chiachia, F.P.G. Bergo, F.O. Favretto, C.L. Yasuda, A. Rocha and A.X. Falcão. Medical image registration based on watershed transform from greyscale marker and multi-scale parameter search. *Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization*, ISSN 2168-1163, doi: 10.1080/21681163.2015.1029643, 5(2), pp. 138–156, 2017.
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- [19] R. Phellan, T. Lindner, A.X. Falcão, and N. D. Forkert. Vessel segmentation in 4D arterial spin labeling magnetic resonance angiography images of the brain. *SPIE on Medical Imaging: Computer-Aided Diagnosis*, Feb. 2017, to appear. **(Finalist for best student paper award)**
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## 8 Patents

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## 9 Graduate students

- PhD:

1. Renato de O. Stehling. Efficient representation and retrieval of images from large heterogenous databases, with Mario Nascimento (Univ. of Alberta), PhD, 1999-2002, FAPESP Grant 98/12899-6.
2. Ricardo da S. Torres, Management of spacial data and images for developing environment applications, with Claudia Bauzer Medeiros (IC-UNICAMP), PhD, 2000-2004, FAPESP Grant 01/02788-7, the best thesis in 2005 by the Brazilian Society of Computing (SBC).
3. Felipe P.G. Bergo, Segmentation of cortical dysplastic lesions in MR-images, PhD, 2004–2008, CAPES, the best thesis in 2009 by the Brazilian Society of Computing (SBC) and honorable mention in 2010 of the best thesis in Computer Science by CAPES.
4. João Paulo Papa, Supervised pattern classification by optimum-path forests, PhD, 2005–2008, CAPES, the best thesis in 2009 from the Brazilian Symposium on Computer Graphics and Image Processing (SIBGRAPI).
5. Leonardo M. Rocha, Clustering by Optimum-Path Forest and its application to Image Analysis, with Luis Meloni (FEEC-UNICAMP), PhD, 2005–2008, CNPq.
6. Jancarlo F. Gomes, Diagnosis of human intestinal parasites by automatic image analysis, IB-UNICAMP, PhD, 2005–2008, CAPES.
7. Paulo A.V. de Miranda, Discrete model for object recognition and delineation, PhD, 2006–2009, FAPESP Grant 05/59808-0, the second best thesis in 2010 by SIBGRAPI.
8. Fábio Cappabianco, Classification of white/gray matter in MR-images by optimum-path forests, with Guido Arajo (IC-UNICAMP), PhD, 2006–2010, FAPESP Grant 05/59902-7.



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  11. Priscila Tiemi Maeda Saito, Active learning with applications to the diagnosis of parasites, with Pedro Rezende, PhD, 2010–2014, CNPq 552559/2010-5.
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  19. Cesar Christian Castelo Fernandez. Interactive Learning of Visual Dictionaries Applied to Image Classification. IC-UNICAMP, FAPESP 2017/03940-5, 2017–.
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- MSc:
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    2. Augusto C. Vannini, 3D visualization in medicine using holographic stereograms, with Cândido Xavier (State Univ. of Maringá), MSc, 1998–2000.
    3. Elisangela de A. Rodrigues, Deformable models for medical image segmentation, MSc, 1998–2000, CAPES.

4. Bruno S. da Cunha, Design of image operators using the image foresting transform, MSc, 1999–2001, FAPESP 99/10100-3.
5. Leonardo M. Rocha, Shell-rendering with shear-warp factorization, MSc, 2000–2002.
6. Felipe P.G. Bergo, Interactive 3D image segmentation, MSc, 2002–2004, CAPES.
7. Romaric Audigier, 3D segmentation and visualization of magnetic resonance images, with Roberto Lotufo (FEEC-UNICAMP), MSc, 2002–2004.
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11. Fernanda A. Andalo, Shape descriptors based on tensor scale, with Ricardo Torres (IC-UNICAMP), MSc, 2005–2007, CNPq, the best dissertation in 2008 by SIBGRAPI.
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15. Cesar Castelo Fernandez, Supervised learning algorithms by optimum-path forest, with Pedro Rezende (IC-UNICAMP), MSc, 2009–2011, CNPq.
16. Juliana Barboza de Carvalho. Evaluation of a new technique (TF-Test Modified) for the diagnosis of intestinal parasites, with Jancarlo Ferreira Gomes (IB-UNICAMP), MSc, CAPES, 2011–2013.
17. Ivan Mingireanov Filho. Image segmentation of rock fragments using optimum-path forest, with Alexandre Campana Vidal (Petroleum Engineering, UNICAMP), MSc, ANP, 2011–2013.
18. Renzo Phellan. Medical Image Segmentation using Statistical and Fuzzy Object Shape Models. MSc, CNPq, 2013–2014.
19. Nikolas Moya. Interactive Segmentation of Multiple 3D Objects in Medical Images by Optimum Graph Cuts. MSc, CAPES e FAPESP 2013/17991-0, 2013–2015.
20. Samuel Martins. A Fast and Robust Negative Mining Approach for User Enrollment in Face Recognition Systems. MSc, with Giovani Chiachia, Samsung, 2013–2015.
21. John Edgar Vargas. Contextual superpixel-based active learning for remote sensing image classification. MSc, with Jefersson dos Santos (UFMG), CNPq, 2013–2015.
22. Alan Zanoni Peixinho. Supervised Learning of Image Features with Convolutional Neuronal Network under Data Constraints. CAPES, MSc, 2014–2017.

23. Bianca Martins dos Santos. Validation of the technique TF-Test Quantified for the diagnosis of the *schistosoma mansoni*, with Jancarlo Ferreira Gomes. IB-UNICAMP, 2013–2015.
24. Felipe Augusto Soares. A New Tool for the Detection of Enteroparasites using the Flootation Principle, with Jancarlo Ferreira Gomes. IB-UNICAMP, 2014–2016.
25. Azael de Melo e Sousa. Lung and Traquea Segmentation in CT-images of the Thorax. CAPES, 2015–2017.
26. Adán Echemendía Montero. Divide-and-Conquer Clustering Approaches based on Optimum-Path Forest. CAPES, 2015–.
27. Deangeli Neves. Active Learning with Visual Data Analysis and its Application to the Diagnosis of Enteroparasites. CAPES, with Jancarlo Ferreira Gomes (FCM-UNICAMP), 2016–.
28. Alexandre Yukio Yamashita. Finding Neuroimage Biomarkers for the Diagnosis of Alzheimer, with Neucimar Jernimo Leite, 2015–2017.
29. Felipe Lemes Galvo. Image Segmentation using Superpixels and Active Learning, 2017–.
30. Brbara Caroline Benato. Autoencoder Neural Network Optimization by Visual Analytics, FAPESP 2016/25776-0, with J.P. Papa (UNESP), 2017–.

## 10 Research grants as PI

1. AnImaLS: Annotation of Images in Large Scale: What can machines and specialists learn from interaction? Joint project with colleagues from UNICAMP, USP, UNESP, Upenn (USA), RuG (Netherlands), WVU (USA), Wageningen Univ. (Netherlands), e Jadavpur U. (India), Thematic FAPESP 2014/12236-1, 2017-2022.
2. Interactive Rural Building Detection and Delineation using Remote Sensing Images. Joint project with colleagues from UFMG and Wageningen Univ., Netherlands, FAPESP 2017/10086-0, 2017–2018.
3. SAMSAM: Segmentation for Analysis and Measurements in the Shoot Apical Meristem. Joint project with colleagues from CALTECH, FAPESP, 2016/11853-2, 2016-2017.
4. Image Annotation in Large Databases. CNPq 479070/2013-0, Call MCT/CNPq 14/2013, 2013–2016, joint project.
5. Visual Computing in Biomedicine and Health. Call PRP/PRPG: Integrated Laboratories of Research. UNICAMP, 2013–2016.
6. Lightweight Robust Face Recognition. Samsung, Corea, 2012–2013.
7. Segmentation and visualization of medical images, CNPq Grant 300698/98-4, 1999–2001.
8. Image foresting transform and its applications in image processing and analysis, CNPq Grant 300698/98-4, 2001–2003.

9. Processing, visualization and analysis of medical images, CNPq Grant 302966/02-1, 2003–2005.
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11. Processing, visualization and analysis of medical images, CNPq Grant 302617/07-8, 2008–2011.
12. Image pattern analysis using graphs and fuzzy models for objects/classes of interest, CNPq Grant 303673/2010-9, 2011–2015.
13. Processing, visualization and analysis of MR-images of the human brain to study epilepsy, Joint project with colleagues of the Faculty of Medical Sciences, UNICAMP, FAPESP Grant 03/13424-1, 2005–2009.
14. Image analysis of human intestinal parasites, Joint project with colleagues of the Inst. of Biology, UNICAMP, FAPESP Grant 03/13424-1, 2004–2008.
15. Approximation Methods for Visual Computing. FAPESP 2007/52015-0, 2008–2013.
16. Machine Learning and Pattern Recognition in Images by Optimal-Path Forests, CNPq Grant 481556/2009-5, 2009-2011.
17. Automation of the Diagnosis of Human Intestinal Parasites, FAPESP Grant 2008/57428-4, 2009 – 2011.
18. 3D Image Analysis of Plant Root Systems for Genotype-Fenotype Associations. FAPESP 2011/03110-6, 2011 – 2012.