

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:** EarthVision, CVPR (2017), CSBC-CTD (2016,2017), CIARP (2016), MICCAI (2015), VipImage (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), SPIE Medical Imaging - Image-Guided Procedures, Robotic Interventions, and Modeling (since 2008), 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 and 2011 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] 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.
- [2] 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, Brazil, pp. 201-208, 2017.
- [3] 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, doi 10.1109/SIBGRAPI.2017.8, Niterói, Brazil, pp. 7-14 2017.
- [4] 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. *MICCAI CVII-STENT Workshop*, LNCS, volume 10552, pp. 39-46, 2017.
- [5] P. E. Rauber, A. X. Falcão, and A. C. Telea. Projections as Visual Aids for Classification System Design. *Information Visualization*, 2017, to appear.
- [6] 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)*, Fort Worth, Texas, USA, 2017, to appear.
- [7] A.C.M. Tavares, P.A.V. Miranda, T.V. Spina, and A.X. Falcão. A Supervoxel-based Solution to Resume Segmentation for Interactive Correction by Differential Image-Foresting Transforms. *13th International Symposium on Mathematical Morphology*, LNCS 10225, doi: 10.1007/978-3-319-57240-6_9, Fontainebleau, France, May 15th-17th, pp. 107–118, 2017.

- [8] 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.
- [9] J.P. Papa, S.E.N. Fernandes, and A.X. Falcão, Optimum-Path Forest based on k-connectivity: Theory and applications, *Pattern Recognition Letters*, doi: 10.1016/j.patrec.2016.07.026, 87(1), pp. 117-126, February 2017.
- [10] A.X. Falco, C. Feng, J. Kustra, and A. Telea. Multiscale 2D medial axes and 3D surface skeletons by the image foresting transform. Book title: *Skeletonization — Theory, Methods and Applications*, Eds. Saha, Borgfors, and Sanniti di Baja, Academic Press, ISBN 978-0-08101291-8, Chapter 2, pp. 43–67, 2017.
- [11] S.B. Martins, T.V. Spina, and A.X. Falcão. A multi-object statistical atlas adaptive for deformable registration errors in anomalous medical image segmentation. *SPIE on Medical Imaging: Image Processing*, Feb. 2017, to appear. **(Finalist for best student paper award)**
- [12] 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)**
- [13] S.V. Incio, J.F. Gomes, B.C.M. Oliveira, A.X. Falcão, C.T.N. Suzuki, B.M. dos Santos, M.C.C. de Aquino, R.S. de P. Ribeiro, D.M. de Assunção, P.A.F. Casemiro, M.V. Meireles, K.D.S. Bresciani. Validation of a New Technique to Detect *Cryptosporidium* spp. *Oocystis* in Bovine Feces. *Preventive Veterinary Medicine*, Elsevier, 134, pp. 1-5, ISSN 0167-5877, <http://dx.doi.org/10.1016/j.prevetmed.2016.09.020>, 2016.
- [14] J.P. Papa, S.E. Fernandes, and A.X. Falcão. Optimum-Path Forest based on k-connectivity: Theory and Applications, *Pattern Recognition Letters*, doi: 10.1016/j.patrec.2016.07.026, 2016, in press.
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the Visual Analytics Science and Technology 2016), doi: 10.1109/TVCG.2016.2598838, 23(1), pp. 101–110, Jan 2017.

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- [21] P.E. Rauber, A.X. Falcão, and A.C. Telea. Visualizing Time-Dependent Data Using Dynamic t-SNE. *In Proc. of the 18th Eurographics Conference on Visualization (EuroVis)*, Groningen, Netherlands, June 6-10, 2016, **honorable mention**, to appear.
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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.

9. Jefersson Alex dos Santos, Semi-automatic classification of remote sensing images, with Ricardo Torres (IC-UNICAMP), Sylvie Philipp-Foliguet (ENSEA, UCP), Philippe-Henri Gosselin (ENSEA, UCP), PhD, Cotutelle UCP-UNICAMP, 2009–2013, FAPESP Grant 2008/58528-2.
 10. André Tavares da Silva, Content-based image retrieval using relevance feedback and optimum-path forest classifier, with Leo Pini Magalhaes (FEEC-UNICAMP), PhD, 2009–2011, CNPq.
 11. Priscila Tiemi Maeda Saito, Active learning with applications to the diagnosis of parasites, with Pedro Rezende, PhD, 2010–2014, CNPq 552559/2010-5.
 12. Giovani Chiachia, Learning Person-Specific Face Representations, with Anderson Rocha (IC-UNICAMP), PhD, 2010–2013, FAPESP 2010/00994-8.
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 17. Samuel Martins. Probabilistic Object Models for Segmentation and Structural Asymmetry Analysis of the Human Brain, 2015–.
 18. John Edgar Vargas. Interactive Annotation of remote sensing images, with Jefersson dos Santos (UFMG), CAPES, FAPESP 2016/14760-5, 2015–.
 19. Alan Zanoni Peixinho. Design of Convolutional Network guided by Visual Analytics. IC-UNICAMP, 2017–.
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 3. Elisângela 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.
8. Fabio Cappabianco, A hardware architecture for the image foresting transform, with Guido Arajo (IC-UNICAMP), MSc, 2004–2006, FAPESP Grant 03/11673-4.
9. Paulo A.V. de Miranda, Image segmentation by the image foresting transform, MSc, 2004–2006, FAPESP Grant 03/09793-1, the best MSc thesis in 2006 by IC-UNICAMP.
10. Celso T.N. Suzuki, Image segmentation of human intestinal parasites, MSc, 2005–2007, FAPESP Grant 04/11218-8.
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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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.
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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 Segmentation in CT-images. 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.
10. Processing, visualization and analysis of medical images, CNPq Grant 302966/02-1, 2005–2008.
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-Phenotype Associations. FAPESP 2011/03110-6, 2011 – 2012.