ROGERS F SILVA

Albuquerque, NM, USA • (505) 504-3031 • Email: rogers.f.silva@gmail.com

SUMMARY OF QUALIFICATIONS

- 6 years of experience in machine learning, image analysis, statistical learning, neural networks.
- 8 years of experience developing algorithms for latent variable models (ICA, PCA, CCA, ISA, IVA)
- Highly skilled in Matlab and R/RStudio with experience in Python and C/C++.
- Experience mapping hard real-world problems into mathematical models, and optimizing solutions.
- Innovative developer of a leading-edge program for multidataset multidimensional learning (MML).
- Numerical optimization expert (constrained, combinatorial, multiobjective (Pareto), stochastic).
- Multimodal Neuroimaging: 7 years (1000+ subject datasets: functional and structural MRI, EEG, DWI).
- Prior exposure to Natural Language Processing using basic cepstral features and GMMs with EM.
- Proficient in design of experiments (DOE) using response surface methodology (RSM).
- Clear and effective writing of peer-reviewed articles, and grant proposals.

PROJECTS

- Multidataset ISA: fusion of multimodal information from thousands of subjects by implementing a new latent variable model utilizing statistical independence at a deeper layer of the neural network and interior point nonlinear-constraint optimization with L-BFGS, leading to a robust generalization of ICA, IVA and ISA models in one single algorithm. Outcome: *1 conference paper, 2 journal articles (1 accepted, 1 in prep.)*. Ongoing.
- Test-Retest Reliability of Diffusion Imaging: Assess the reproducibility of diffusion indices and network measures derived from DTI and DSI data. Outcome: *1 journal article (in prep.)*. Ongoing.
- Decentralized joint ICA: designed a proof-of concept simulation using a GARCH time-series model, which demonstrated the benefit of distributed joint ICA over regular joint ICA. Mentor undergraduate student. Outcome: *2 conference papers, 1 journal article (in preparation)*. Ongoing.
- Decentralized IVA: extension of IVA for distributed processing of decentralized data. Mentor undergraduate student. Outcome: *1 conference paper (accepted)*. Ongoing.
- Memory Efficient group PCA: identified connections and trade-offs between different group PCA algorithms using Pareto-optimal analysis, leading to two optimized implementations. Extensive writing contributions. Outcome: *2 journal articles*. 2014-2015.
- Multimodal Kaggle competition: designed, managed a machine learning Kaggle challenge: classify schizophrenic patients using real data features from multimodal MRI data. Outcome: *348 players (2244 entries), 1 conference paper*. 2014.
- Stochastic Neuroimaging simulation: reshuffling optimization technique for neuroimaging data using simulated annealing, conforming data samples into meaningful spatial maps (working towards shipping this tool in the SimTB toolbox: http://mialab.mrn.org/software/simtb/). Outcome: 2 *journal articles*. 2012-2014.
- NICE: consulting feedback on the theory, interpretation and testing of nonlinear ICA using NICE. 2015.

EDUCATION

Ph.D. in Computer Engineering — anticipated May/2017
The University of New Mexico — Albuquerque, NM
Biomedical Image Processing track — GPA: 3.81/4.0

- Thesis: "Multidataset Independent Subspace Analysis: A Framework for Analysis of Multimodal, Multi-subject Brain Imaging Data"
- Courses in: Advanced machine learning, Pattern recognition, Statistical inference, Bayesian learning, Spatiotemporal statistics, MCMC, Gene microarray analysis, etc.

Master of Science in Computer Engineering — Dec/2011
The University of New Mexico — Albuquerque, NM
Image Processing track — GPA: (see Ph.D. above)

- Graduate Minor in Statistics.
- Graduate Minor in Mathematics.

Bachelor of Science in Electrical Engineering — Dec/2003
Catholic University (PUCRS) — Porto Alegre, Brazil
Computer architecture track — GPA: 3.5/4.0

- Thesis: "Deployment of Digital Filter Banks for Acoustic Tuning of Musical Instruments."
- Instructor of a special topics seminar: "Introduction to object-oriented programming."

Bachelor of Science in Computer Science (2 out of 4 years) 1999-2005
Federal University (UFRGS) Porto Alegre, Brazil

- Courses in: operations research, operating systems, data bases with SQL, software engineering, computational logic, computer architecture and organization, and data structures.

PUBLICATIONS

- 7 **journals**: 2 as first-author, 5 as co-author.
- 9 **conference papers**: (4 as first-author, 5 as co-author). 9 **abstracts**: (8 as first-author, 1 as co-author).

RELEVANT PROFESSIONAL EXPERIENCE

Postdoctoral Fellow Spring 2017 – Present
Medical Image Analysis Lab, The Mind Research Network (MRN) Albuquerque, NM
Graduate Research Assistant Spring 2007 – Fall 2016
Medical Image Analysis Lab, The Mind Research Network (MRN) Albuquerque, NM

- Developed new latent variable models and algorithms for exploratory data analysis of multimodal datasets (ICA, PCA, CCA, ISA, IVA, MISA) implementing numerical optimization techniques.
- Reviewed, implemented, and tested novel models for statistical signal processing, machine learning, and brain image analysis.
- Developed a novel simulation framework to test hypotheses and validate image analysis systems.
- Wrote articles for publication in peer-reviewed journals and conferences.
- Provided critical feedback on linear algebra, optimization, and simulations to peers and collaborators.
- Collaborated in the preparation of grant proposals.
- Reviewer for NeuroImage, IEEE Trans. Image Processing, Journal of Neuroscience Methods.
- Recruited subjects and performed data collection at an MRI scanner.
- Provided technical support in lab activities (e.g., courses sponsored by MIALab).

Research Fellow 05/2016 – 07/2016
Mellon Institute, CNBC / University of Pittsburgh / Carnegie Mellon University Pittsburgh, PA

- Multimodal Neuroimaging Training Program (MNTP) – Diffusion Imaging.

Visiting Fellow 04/2016 – 05/2016
Martinos Center, MGH / Harvard University / MIT Boston, MA

- MGH/HST Multimodality Short Course.

Research Assistant 03/2001 – 09/2003
MetroPOA Networks Communication Lab, Catholic University (PUCRS) Porto Alegre, Brazil

- Object-oriented programming with Delphi.
- OO software engineering using UML.

RELATED EXPERIENCE, SKILLS, AND MEMBERSHIPS

- scikit-mage, ggplot2, LASSO, SAS, Minitab, LaTeX.
- Fluent in English, Portuguese, Spanish.
- Student Member: IEEE, Organization for Human Brain Mapping (OHBM).

RELATED COURSES, AWARDS

- FMRI Analysis Course at MRN (LBERI), NM.
- Summer School: Mathematics in Brain Imaging at UCLA (NITP) (2008).
- Business Plan and Entrepreneurship course (Summer 2005).
- Workshop on databases and ontologies (Spring 2005)
- DELL Short Course on Linux Cluster Setup (Spring 2004)
- Research Assistantship Award by UNM Electrical and Computer Engineering Dept. (since Fall 2006).
- Conference support awards: San Francisco, Barcelona, China, Toronto, and Quebec-City, Hawaii (2008-2015).
- Top-of-the-class Student Award in Electrical Engineering (Class of 2003).

EMPLOYMENT HISTORY

Consulting Engineer Spring 2006
Maquinas Medianeira Porto Alegre, Brazil
Lecturer Fall 2005
Contestado University Contestado, Brazil

- Taught an undergraduate level class on robotics. Prepared class notes, homeworks and exams.

Electrical Engineer 10/2003 – 08/ 2005
MURI Assembly Systems Porto Alegre, Brazil

- Designed, supervised deployment of assembly lines for Brose Chicago, Magneti Marelli, DANA, Whirlpool.
- Interacted directly with clients to assess their needs and identify solutions.
- Consulting services to peers in different departments and in new incoming projects.

Volunteer Laboratory Assistant 08/1999 – 07/2000
Automation and Systems Control Group, Catholic University (PUCRS) Porto Alegre, Brazil

ROGERS F SILVA

Albuquerque, NM, USA • (505) 504-3031 • email: rogers.f.silva@gmail.com

PUBLICATION LIST

Journal

[1] **R.F. Silva**, S.M. Plis, J. Sui, M.S. Pattichis, T. Adalı, V.D. Calhoun, "Blind Source Separation for Unimodal and Multimodal Brain Networks: A Unifying Framework for Subspace Modeling," IEEE JSTSP, vol. 10 (7), pp.1134-1149, 2016.

[2] D.A. Bridwell, S.Rachakonda, **R.F. Silva**, G.D. Pearlson, V.D. Calhoun, "Spatiospectral decomposition of multi-subject EEG: evaluating blind source separation algorithms on real and realistic simulated data," Brain Topography, pp. 1-15, 2016. PMID: 26909688

[3] S. Rachakonda, **R.F. Silva**, J. Liu, V.D. Calhoun, "Memory efficient PCA methods for large group ICA," Frontiers in Neuroscience, Brain Imaging Methods, vol. 10 (17), 2016.

[4] V.D. Calhoun, **R.F. Silva**, T. Adalı, S. Rachakonda, "Comparison of PCA approaches for very large group ICA," in NeuroImage, vol. 118, pp. 662–666, 2015.

[5] **R.F. Silva**, S.M. Plis, T. Adali, and V.D. Calhoun, "A statistically motivated framework for simulation of stochastic data fusion models applied to multimodal neuroimaging," Neuroimage, vol. 102 Pt 1, pp. 92-117, 2014.

[6] V.D. Calhoun, V. Potluru, R. Phlypo, **R.F. Silva**, B. Pearlmutter, A. Caprihan, S.M. Plis, and T. Adalı, "Independent component analysis for brain fMRI does indeed select for maximal independence," PLoS ONE, vol. 8, 2013.

[7] E. Allen, E. Erhardt, E. Damaraju, W. Gruner, J. Segall, **R.F. Silva**, M. Havlicek, S. Rachakonda, J. Fries, R. Kalyanam, A. Michael, J. Turner, T. Eichele, S. Adelsheim, A. Bryan, J. R. Bustillo, V. P. Clark, S. Feldstein, F. M. Filbey, C. Ford, K. Hutchison, R. Jung, K. A. Kiehl, P. Kodituwakku, Y. Komesu, A.R. Mayer, G.D. Pearlson, J. Phillips, J. Sadek, M. Stevens, U. Teuscher, R.J. Thoma, and V.D. Calhoun, "A baseline for the multivariate comparison of resting state networks," Frontiers in Systems Neuroscience, vol. 5, p. 12, 2011.

Conference

[1] N.P. Wojtalewicz, **R.F. Silva**, V.D. Calhoun, A.D. Sarwate, S.M. Plis, "Decentralized Independent Vector Analysis," in Proc. IEEE ICASSP 2017, New Orleans, LA, 2017.

[2] H. Imtiaz, **R.F. Silva**, B. Baker, S.M. Plis, A.D. Sarwate, V.D. Calhoun, "Differentially private source separation for distributed data using independent component analysis," in Proc. IEEE CISS 2016, Princeton, NJ, 2016.

[3] B. Baker, **R.F. Silva**, V.D. Calhoun, A.D. Sarwate, S.M. Plis, "Large scale collaboration with autonomy: decentralized data ICA," in Proc. IEEE MLSP, Boston, MA, 2015.

[4] **R.F. Silva**, S.M. Plis, T. Adalı, and V.D. Calhoun, "Multidataset Independent Subspace Analysis Extends Independent Vector Analysis," in Proc. ICIP 2014, Paris, France, 2014.

[5] **R.F. Silva**, E. Castro, N. Gupta, M. Cetin, M. Arbabshirani, V. Potluru, S.M. Plis, and V.D. Calhoun, "The Tenth Annual MLSP Competition: Schizophrenia Classification Challenge," in Proc. IEEE MLSP, Reims, France, 2014.

[6] E.A. Allen, E.B. Erhardt, E. Damaraju, W. Gruner, J.M. Segall, **R.F. Silva**, M. Havlicek, S. Rachakonda, J. Fries, R. Kalyanam, A.M. Michael, A. Caprihan, J.A. Turner, T. Eichele, S. Adelsheim, A. Bryan, J. Bustillo, V.P. Clark, S. Feldstein-Ewing, F.M. Filbey, C. Ford, K. Hutchison, R.E. Jung, K.A. Kiehl, P. Kodituwakku, Y. Komesu, A.R. Mayer, G.D. Pearlson, J. Phillips, J. Sadek, M. Stevens, U. Teuscher, R.J. Thoma, and V.D. Calhoun, "A baseline for the multivariate comparison of resting state networks," in Biennial Conference on Resting State / Brain Connectivity Milwaukee, WI, 2010.

[7] **R.F. Silva** and V.D. Calhoun, "Identification of Brain Image Biomarkers by Optimized Selection of Multimodal Datasets," in Proc. ISMRM, Toronto, 2008.

[8] **R.F. Silva** and V.D. Calhoun, "Identification of Brain Imaging Biomarkers by Optimized Selection of Multimodal Independent Components," in Proc. IEEE SSIAI, Santa Fe, NM, 2008.

[9] V.D. Calhoun, **R.F. Silva**, and J. Liu, "Identification of Multimodal MRI and EEG Biomarkers Using Joint-ICA and Divergence Criteria," in Proc. MLSP, 2007.

Abstract

[1] **R.F. Silva**, S.M. Plis, M.S. Pattichis, T. Adali, V.D. Calhoun. "Incorporating Second-Order Statistics in Multidataset Independent Subspace Analysis," in Proc HBM, Honolulu, HI, 2015.

[2] **R.F. Silva**, S.M. Plis, T. Adalı, and V.D. Calhoun, "Multidataset Independent Subspace Analysis," in Proc. HBM, Hamburg, Germany, 2014.

[3] **R.F. Silva** and V.D. Calhoun, "A Statistically Motivated Simulation Framework for Data Fusion Models Applied to Neuroimaging," in Proc. HBM, Seattle, WA, 2013.

ROGERS F SILVA

[4] V.D. Calhoun, V. Potluru, R. Phlypo, **R.F. Silva**, B. Pearlmutter, A. Caprihan, S.M. Plis, and T. Adalı, "Independent component analysis for brain fMRI does indeed select for maximal independence," in Proc. HBM, Seattle, WA, 2013.

[5] **R.F. Silva** and V.D. Calhoun, "An Assessment of the Limitations of Joint ICA in Multimodal Data Fusion," in Proc. HBM, Beijing, China, 2012.

[6] **R.F. Silva** and V.D. Calhoun, "Validating Divergence as a Tool for Assessment of Group Differences in a JICA Fusion Framework," in Proc. HBM, Quebec-City, CA, 2011.

[7] **R.F. Silva** and V.D. Calhoun, "Evaluating Joint Histograms in a JICA Fusion Framework: Feature Extraction and Component Selection," in Proc. HBM, Barcelona, Spain, 2010.

[8] **R.F. Silva** and V.D. Calhoun, "Divergence Measurements for the Optimal Identification of Multimodal Biomarkers," in Proc. HBM, San Francisco, CA, 2009.

[9] **R.F. Silva**, J.G. Silveira, R. Balbinot, "Plataforma DeskEaD para Aplicações de Educação a Distância (DeskDE Platform for Distance Education Applications)," in Proc. 4th RNP2 Workshop, 2003, Catholic University (PUCRS), Porto Alegre, Brazil.

REFERENCES

Vince D. Calhoun, Ph.D.
Executive Science Officer
The Mind Research Network
&
Distinguished Professor of Electrical and Computer Engineering (primary), Biology, Computer Science, Neurosciences, & Psychiatry
The University of New Mexico
Tel: (505) 272-1817, Fax: (505) 272-8002
Email: vcalhoun@mrn.org

Marios S. Pattichis, Ph.D.
Professor
Computer Engineering Program Chair
The University of New Mexico
Tel: (505) 277-0486
Email: pattichis@ece.unm.edu

Sergey M. Plis, Ph.D.
Assistant Professor of Translational Neuroscience
Director of Machine Learning in Neuroscience Lab
The Mind Research Network
Tel: (505) 272-2869, Fax: (505) 272-8002
Email: splis@mrn.org