

# Maziar Yaesoubi

The Mind Research Network  
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## EDUCATION

- Ph.D. in Electrical and Computer Engineering, *University of New Mexico, Albuquerque, NM* *July 2016*  
under supervision of *Dr. Vince D. Calhoun*  
Dissertation title:  
“On Frequency Variation of Dynamic Resting-state Functional Brain Network Activation and Connectivity with Applications to both Healthy and Clinical Populations”
- M.S. in Computer Science, *Linköping University, Linköping, Sweden* *Aug 2009*  
under supervision of *Dr. Lars Ahrenberg*  
Thesis title:  
“Machine transcription conversion between Perso-Arabic and Romanized writing systems”
- B.S. in Computer Engineering, *Sharif University of Technology, Tehran, Iran* *Aug 2006*

## RESEARCH EXPERIENCE

- **Post-doctoral fellow**, *The Mind Research Network (MRN), Albuquerque, NM* *Aug 2016 – present*
  - My current research is focused on the design and implementation of a framework to summarize brain imaging data (i.e. bases transformation and dimension reduction) while considering different modulation processes of neural-related activation and co-activation of the brain. Such variation in modulation process occurs when combining data from multiple imaging modalities and can also occur in a single modality due to heterogenous neurobiological characteristics of different areas of the brain. This framework, built on top of the common summarization approaches such as independent component analysis, incorporates these variations of modulation process and can be used in either unimodal or multi-modal brain imaging analysis. Through the novel transformation of brain imaging data to Hilbert space, this framework facilitates the characterization of different modulation processes by their instantaneous frequency characteristics.
- **Research assistant**, *University of New Mexico and The Mind Research Network (MRN)* *Aug 2012 – Aug 2016*
  - The main focus of my Ph.D. research was investigating characteristics of functional connectivity of the brain during resting-state. I designed and implemented a novel framework that captures variation of functional connectivity jointly in time (dynamics) and frequency domains. One of the key and novel observations of this research was that the functional connectivity of the brain at a given time-point, in fact, is comprised of multiple frequency-specific connectivity patterns each having their own specific characteristics. Common approaches for functional connectivity analyses are unable to distinguish these frequency-specific connectivity states.
  - As a secondary research focus, I applied my experience in image processing and computer vision to design optimization-based registration systems to capture the

complicated motion of non-rigid objects. These registration systems have potential applications to a variety of imaging techniques such as HDR and Extended Depth of Field micro imaging.

- **Research intern**, *SK Infrared LLC, Albuquerque, NM* *May 2011 – Aug 2012*
  - I was part of a team researching application of infrared imaging for early detection of skin cancer. I was involved in designing software for registration of infrared images as well as visualization and statistical analysis of the data captured by such imaging systems in pursuit of early skin cancer detection.
- **Research assistant**, *Linköping University, Linköping, Sweden* *Aug 2008 – Aug 2009*
  - I designed a system for automatic syllabification of Perso-Arabic script and machine transcription conversion between Perso-Arabic and Dabire

## INDUSTRY EXPERIENCE

- **Software engineering intern**, *Nemetschek Vectorworks, Columbia, MD* *Summer 2014*
  - Working for a globally recognized software development company provided me with a great opportunity to look under the hood of a large-scale software product and to participate in debugging and developing new features for their next release.

## SOFTWARE SKILLS

Matlab, R, C++, Tensorflow, Keras, SQL, MPI, OpenMP, Hadoop, Spark, OpenCV

## REFEREED JOURNAL PUBLICATIONS

*Citations: 245*  
*h-index: 5 as of Feb. 2018*

- [J8] **Yaesoubi, Maziar**, Tülay Adalı, and Vince D. Calhoun. "A window-less approach for capturing time-varying connectivity in fMRI data reveals the presence of states with variable rates of change." *Human brain mapping* (2018)
- [J7] **Yaesoubi, Maziar**, Robyn L. Miller, and Vince D. Calhoun. "Time-varying spectral power of resting-state fMRI networks reveal cross-frequency dependence in dynamic connectivity." *PloS one* (2017)
- [J6] **Yaesoubi, Maziar**, et al. "A joint time-frequency analysis of resting-state functional connectivity reveals novel patterns of connectivity shared between or unique to schizophrenia patients and healthy controls." *NeuroImage: Clinical* (2017)
- [J5] Miller, Robyn L., **Maziar Yaesoubi**, and Vince D. Calhoun. "Cross-frequency rs-fMRI network connectivity patterns manifest differently for schizophrenia patients and healthy controls." *IEEE signal processing letters* (2016)
- [J4] Miller, Robyn L., **Maziar Yaesoubi**, et al. "Higher dimensional meta-state analysis reveals reduced resting fMRI connectivity dynamism in schizophrenia patients." *PloS one* (2016)
- [J3] **Yaesoubi, Maziar**, et al. "Dynamic coherence analysis of resting fMRI data to jointly capture state-based phase, frequency, and time-domain information." *NeuroImage* 120 (2015)
- [J2] **Yaesoubi, Maziar**, Robyn L. Miller, and Vince D. Calhoun. "Mutually temporally independent connectivity patterns: A new framework to study resting state brain dynamics with application to explain group difference based on gender." *NeuroImage* (2015)
- [J1] Sen, P. , Khademi Kalantari, N. , **Yaesoubi, M.**, Darabi, S. , Goldman, D. and Shechtman, E. , Robust Patch-Based HDR Reconstruction of Dynamic Scenes, *ACM Transactions on Graphics*, Vol. 31, No. 6, November 2012, (Proceedings of ACM SIGGRAPH Asia 2012)

## PEER-REVIEWED CONFERENCE PUBLICATIONS

- [C8] **Yaesoubi, M.** et al., "In-between and cross-frequency dependence-based summarization of resting-state fMRI data." IEEE Southwest Symposium on Image Analysis and Interpretation (SSIAI), in press.
- [C7] **Yaesoubi, M.** and Calhoun V.D., "Adaptive windowing and windowless approaches to estimate dynamic functional brain connectivity." Wavelets and Sparsity XVII. Vol. 10394. International Society for Optics and Photonics, 2017.
- [C6] **Yaesoubi, M.**, Miller, R.L., Adali, T. and Calhoun, V.D., Time-varying frequency modes of resting fMRI brain networks reveal significant gender differences, in 2016 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) (pp. 6310-6314). IEEE.
- [C5] Miller, R.L., **Yaesoubi, M.** and Calhoun V.D., Meta-State Analysis Reveals Reduced Resting fMRI Connectivity Dynamism in Schizophrenia Across Multiple Multivariate Analytic Techniques, Brain Connectivity, Fourth Biennial Resting State Conference, Boston 2014
- [C4] Miller, R.L., **Yaesoubi, M.** and Calhoun, V.D., Higher Dimensional Analysis Shows Reduced Dynamism of Time-Varying Network Connectivity in Schizophrenia Patients, Engineering in Medicine and Biology Society (EMBC), IEEE 36th Annual International Conference, Chicago, IL 2014
- [C3] Miller, R.L., **Yaesoubi, M.**, and Calhoun V.D., Higher Dimensional fMRI Connectivity Dynamics Show Reduced Dynamism in Schizophrenia Patients, Workshop on Pattern Recognition in Neuroimaging (PRNI), Tuebingen, Germany 2014
- [C2] Calhoun V., **Yaesoubi, M.**, Rashid, B. and Miller, R.L., Characterization of Connectivity Dynamics in Intrinsic Brain Networks, IEEE Global Conference on Signal and Information Processing (GlobalSIP), Dallas, TX 2013
- [C1] Maleki, J., **Yaesoubi, M.** and Ahrenberg, L., "Applying Finite State Morphology to Conversion Between Roman and Perso-Arabic Writing Systems", Frontiers in Artificial Intelligence and Applications; Vol. 191, pp. 215-223. Post-proceedings of the 7th International Workshop FSMNLP 2008

## PATENTS

- "Method and system for feature extraction and decision making from series of images", US20150187068A1
- "Dynamic covariance estimation of a multivariate signal with no smoothing or windowing operation", pending.

## PROFESSIONAL ACTIVITIES

- **Organizing committee member**
  - The Brainhack Global, Albuquerque, NM 2017
  - American Statistical Association (ASA) DataFest, Albuquerque, NM 2017
- **Reviewer**
  - NeuroImage
  - NeuroImage: Clinical
  - Human Brain Mapping
  - IEEE Transactions on Image Processing
  - Nature Scientific Reports
  - Psychiatry Research: Neuroimaging
  - IEEE International Conference on Acoustics, Speech and Signal Processing

## **INVITED TALKS AND CONFERENCE PRESENTATIONS**

- **IEEE Southwest Symposium on Image Analysis and Interpretation, Las Vegas, NV**
  - In-between and cross-frequency dependence-based summarization of resting-state fMRI data
- **Experimental Program to Stimulate Competitive Research (EPSCoR), Albuquerque, NM**
  - Advances in data-driven approaches to capture dynamic functional connectivity with variate rates of change
- **Brainhack, Albuquerque, NM**
  - A window-less approach for capturing time-varying connectivity in fMRI data reveals the presence of states with variable rates of change
- **Wavelets and Sparsity XVII, The international society of optics and photonics (SPIE.), San Diego, CA**
  - Adaptive windowing and windowless approaches to estimate dynamic functional brain connectivity
- **IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Beijing, China\***
  - Time-varying frequency modes of resting fMRI brain networks reveal significant gender differences

\*Presented by one of the co-authors.
- **Finite-State Methods and Natural Language Processing – FSMNLP, Ispra, Italy**
  - Applying Finite State Morphology to Conversion Between Roman and Perso-Arabic Writing Systems