Sergul Aydore

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CURRENT POSITION

Machine Learning Scientist at Amazon Supply Chain Optimization Technologies (SCOT) forecasting team (since Dec 2016)

SKILLS

Signal Processing, Statistical Modeling, Statistics, Machine Learning, Deep Learning, Natural Language Processing, Predictive Modeling, Time-Frequency Analysis, Matlab, Python, Spark, Hadoop (beginner), Scala (beginner)

EDUCATION

PhD: University of Southern California, Electrical Enginnering with minor in Statistics (2009-2014)
- Thesis title: Measuring Functional Connectivity of the Brain
- Supervisor: Prof. Richard M Leahy

M.S.: Bogazici University, Electrical Enginnering (2007-2009)
- Thesis title: Wheeze detection in respiratory sounds via statistical signal modeling
- Supervisors: Prof. Kivanc Mihcak, Prof. Yasemin Kahya, Prof. Ata Akin

B.S.: Bogazici University, Electrical Enginnering (2002-2007)
- Thesis title: System Identification of Human Brain
- Supervisors: Prof. Kivanc Mihcak, Prof. Ata Akin

PUBLICATIONS

- **S. Aydore**, R.M. Leahy, "Measuring Functional Connectivity in Presence of Crosstalk" , *to be submitted to Neuroimage*.
- **S. Aydore**, D. Pantazis, R.M. Leahy, "A Note on the Phase Locking Value and its Properties" , *Neuroimage*, February, 2013.
- **S. Aydore**, M.K. Mihcak, A. Akin, R. K. Ciftci, "On Temporal Connectivity of PFC via Gauss-Markov Modeling of fNIRS Signals", *IEEE Transactions on Biomedical Engineering*, March 2010.
- **S. Aydore**, S. Ashrafulla, A. A. Joshi, R. M. Leahy, "A Measure of Connectivity in the Presence of Crosstalk", *Asilomar Conference on Signals, Systems and Computers*, November 3-6, 2013, Pacific Grove, CA, USA.
- **S. Aydore**, D. Pantazis, R. M. Leahy, "Phase Synchrony in Multivariate Gaussian Data with Applications to Cortical Networks", *ISBI* 2012, Barcelona, Spain.
- **S. Aydore**, I.Sen, M. Kivanc Mihcak, Y. P. Kahya, "Classification of Respiratory Signals by Linear Analysis", *31st Annual International IEEE EMBS Conference*, September, 2-6, 2009, Hilton Minneapolis, Minnesota, USA.
- **S. Aydore**, I. Sen, M. K. Mihcak, Y. P. Kahya, "Classification of Wheeze in Respiratory Sounds by Linear Discriminant Method", *IEEE 17th Signal and Image Communications Applications*, Antalya, Turkey, April 9-11, 2009.
- **S. Aydore**, M. K. Mihcak, A. Akin, "System Identification of Prefrontal Cortex in the Presence of Coginitive Tasks", *Biomedical Optics Topical Meeting (BIOMED)* St. Petersburg, Florida, USA, March 2008.
- **S. Aydore**, Victor Shih, Christian Kothe, Scott Makeig, Paul Sajda, "Evoked EEG and Pupillary Measures Predictive of Choice Confidence in Complex Task Environments", *Human Brain Mapping (HBM), June 8-12, 2015*

- **S. Aydore**, S. Ashrafulla, R. M. Leahy, "Regularized Partial Lagged Coherence for Functional Connectivity Analysis in the Presence of Cross-talk", *Human Brain Mapping (HBM)*, June 8-12, 2014, Hamburg, Germany.
- S. Dery, **S. Aydore**, S. Ashrafulla, Esther Florin, E. Both, R. M. Leahy, S. Baillet, F. Tadel, "Functional Connectivity using Brainstorm", *Human Brain Mapping (HBM)*, June 16-20, 2013, Seattle, USA.
- **S. Aydore**, R. M. Leahy, "The Partial Phase Locking Value for Circular Gaussian Processes", *BIOMAG* 2012, France. (Best PhD poster award).
- **S. Aydore**, D. Pantazis, R. M. Leahy, "Measuring Partial Phase Locking Value to Detect Synchronization in Multivariate Gaussian Systems", *NeuroInformatics* 2011, Boston, MA, USA.
- **S. Aydore**, D. Pantazis, J. Mosher, R. M. Leahy, "Statistical Analysis of Phase and Amplitude via Partial Coherence in Hilbert Transform Domain", *Human Brain Mapping (HBM)*, June, 26-30, 2011, Quebec City, Canada.

SELECTED BLOG POSTS

- **S. Aydore**, S. Ashrafulla, "Using Apache Spark to Analyze Large Neuroimaging Datasets", Domino Data Labs, August 2016.

HONORS and AWARDS

- Winner of IdeaHub competition at JP Morgan for the project "Machine Learning Augmentation for real time Application monitoring", $500K, New York, NY, 2016.
- Travel grant from Women in Science and Engineering at USC for HBM, 2014, Hamburg, Germany; Asilomar Conference, 2013, Pacific Grove, CA; BIOMAG, 2012, Paris, France; HBM, 2011, Quebec, Canada.
- Ming Hsieh Institute Ph.D. Scholar, (given to six outstanding senior Ph.D. students in Electrical Engineering Department at USC) , 2013.
- Best PhD poster award, BIOMAG, 2012, Paris, France.
- National Publication Award from Brain Research Society-Turkey for the paper "Sergul Aydore, M. Kivanc Mihcak, Koray Ciftci, Ata Akin: On Temporal Connectivity of PFC Via Gauss-Markov Modeling of fNIRS Signals, IEEE Transactions on Biomedical Engineering, 57(3): 761-768, 2010."
- Opportunity Grant from EducationUSA funded by the U.S. Department of States Bureau of Educational and Cultural Affairs (2009)
- Viterbi School of Engineering Doctoral Fellowship Award to pursue a PhD degree in Electrical Engineering at University of Southern California (2009)
- Necmi Tanyolac award from Biomedical Engineering Institute at Bogazici University (2009)
- OSA Foundation Grant to attend Biomedical Optics, March 14-21 St. Petersburg, FL, USA. (2008)
- Graduate scholarship from TUBITAK (The Scientific and Technological Council of Turkey) (2007-2009)
- Undergraduate scholarship from Eskisehir ETI Company (2002-2007)
- Graduated with Honors Certificate from Bogazici University, Department of Electrical and Electronics Engineering (2007)
- Top 250 over 1,500,000 people in University Entrance Exam in Turkey, 2002.

INDUSTRY EXPERIENCE

- Machine Learning Scientist, Forecasting team, Amazon (starts December 2015)
- Data Scientist, CIB Data Science, JP Morgan Chase (September 2014, October 2015)
  - I use engineering and mathematical approaches to solve business problems in investment banking. I use Python on a daily basis and I started using big data technologies such as Spark recently. Mathematical or data science approaches I use depend on the business problem but usually vary from Bayesian models to simple supervised learning algorithms.

RESEARCH EXPERIENCE

- Postdoctoral Research Scientist at Laboratory for Intelligent Imaging and Neural Computing (LIINC), Columbia University (Spring 2014 - Fall 2015)
  - I applied machine learning and signal processing to EEG data in order to classify different tasks where subjects perform in a real word experiment. Specifically I investigated the behavior of very noisy time series with temporal resolution in the order of miliseconds to understand the human brain.
- Research Assistant at University of Southern California, Biomedical Imaging Group (Fall 2009-2014)
  - I developed models to reliably estimate the relationships between different parts of a system. For my thesis, this system was one of the most challenging systems - the human brain- but can be generalized to other time series datasets. In addition to the programming skills, this work requires strong analytical skills in the areas of time-frequency and image analysis, linear algebra, stochastic processes and statistics. Most recently, I constructed a novel metric which better estimates the relationship between sets of signals in presence of interference and cross-talk. This method allowed us to reduce the spurious relationship while estimating the true interaction between brain signals. I also contributed to the connectivity toolbox of open software Brainstorm for EEG/MEG analysis.
- Research Assistant at Bogazici University, Signal and Image Processing Laboratory (BUSIM) (2006-2008 Spring) and Lung Acoustics Laboratory (BULAL) (2008 Fall-2009 Spring).
  - Understanding the respiratory sounds is a very important concept for diagnosing the respiratory diseases. Wheezes are one type of adventitious sounds. Those are musical sounds and have some distinct properties in time-frequency domain compared to normal sounds. Our aim was to detect those wheezes by using methods from spectral estimation and detection estimation theory.
  - Image watermarking in the transform domain instead of spatial domain provides robustness and security in the presence of geometric attacks. It has been shown that image properties in NMF (Non-Negative Matrix Factorization) domain do not change significantly even an arbitrary attack is applied to the original image. Hence, inspiring from this, our aim was to achieve robust and secure watermarking against the geometric attacks.
  - fNIRS (functional Near Infrared Spectroscopy) is a device that measures the oxy and deoxy hemoglobin concentration change in the blood. We used fNIRS in the presence of cognitive tasks, i.e. we asked easy, normal and difficult questions to the subjects. Then, by using statistical signal processing techniques we investigated some differences in the oxy hemoglobin concentration between those question types. Moreover, we collected data from schizophrenic people with the same method. Our aim was to classify data of healthy and schizophrenic people.

TEACHING EXPERIENCE

- Teaching Assistant at University of Southern California for the classes
  - *Introduction to Digital Signal Processing (Fall 2010)* and *Foundations of Electrical Engineering Systems (Spring 2011)*
- Teaching Assistant at Bogazici University for the classes
  - *Probability for Electrical Enginners (Fall 2008)* and *Linear Algebra (Fall 2007)*

INVITED TALKS

- Big data processing overview and demo using AWS, New Product Development Department at JP Morgan, March, 2016
- Deep Learning Workshop, Data Science Institute, Columbia University, February 2015, New York, NY, USA.
- Organization of Human Brain Mapping, Annual Meeting, (OHBM 2014) June 2014, Hamburg, GERMANY.
- Cognitive Neurophysiology Laboratory, University of California Los Angeles, May 2014, Los Angeles, CA, USA.
- Laboratory for Intelligent Imaging and Neural Computing, Columbia University, May 2014, New York, NY, USA.
- 18th International Conference on Biomagnetism (BIOMAG 2012), August 2012, Paris, FRANCE.

TRAINING

- Visiting researcher on my own pocket to Parietal-INRIA team in Paris for developing machine learning benchmark for fMRI data set (11/2016)
- Big Data Processing with Hadoop and Spark, 36 hours/ 6 weeks of training by Metis (student, 02/2016)
- PyData NYC 2015, New York, NY (attendee, 09/2016)
- Machine Learning Workshop in Finance, Data Science Institute, Columbia University (attendee, 03/2015)
- Compumedics Neuroscan Maglink School, Simultaneous acquisition of EEG and fMRI data, Dana and David Dornsife Cognitive Neuroscience Imaging Center, USC (attendee, 03/2010)
- Epilepsy Center, Cleveland Clinic, 2 week training on epilepsy patient management and treatment (05/2010)
- MEG Software Planning Meeting, MGH Martinos Center, Charlestown, MA (03/2011)
- BrainStorm, MNE and Brainsuite Developers Meeting, Cleveland, OH (04/2012)
- MEG : Applications to Cognitive Neuroscience, McGovern Institute, MIT, MA (04/2012)

OTHER PROFESSIONAL ACTIVITIES and SERVICE

- Reviewer for member of Technical Program Committee for GlobalSIP Symposium on Big Data Analysis and Challenges in Medical Imaging (2016 July)
- Reviewer for the journal “PlosOne” (2015 Fall - current)
- Reviewer for the journal “NeuroImage” (2014 Spring - current)
- Reviewer for the journal “Mathematical Problems in Engineering” (2008 Fall)

MEMBERSHIP

- IEEE Professional Member
- Organization of Human Brain Mapping

Immigration Status

- Permanent resident (self-sponsored in National Interest Waiver Category thanks to my academic achievements)