Neda Sadeghi, Ph.D.
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SUMMARY

Experienced researcher in organization and management of neuroimaging research projects involving subjects of different age groups, and patients with neurological and psychiatric disorders. Development of advanced tools to detect imaging markers. Effective at working in teams, with clinical collaborators and different disciplines. Strong communication and analytical skills.

LEADERSHIP EXPERIENCE

- Chair and Vice Chair of 5th and 6th Mountain West Biomedical Engineering Conference
- Trained NIH personnel at the post-doctoral and pre-doctoral in following best practices in neuroimaging studies
- Initiated an MRI experiment to study mirror movements in patients with Moebius syndrome. Elucidated anomaly of the brain pathway involved in this disorder.
- Member of National Institute of Child and Human Development (NICHD) Fellows Advisory Committee. Researched and determined qualifications and avenues for providing grants for postdoctoral fellows.
- Developed a new approach to performing morphometric studies with increased sensitivity in detecting morphological abnormalities of white matter pathways.
- Served as a reviewer for the following journals: Cerebral Cortex, NeuroImage, Human Brain Mapping, and Medical Image Analysis
- Provided expertise on best practices for data analysis and machine learning to members of multiple NIH intramural research projects

EDUCATION

Ph.D. in Bioengineering December 2013
Scientific Computing and Imaging Institute
University of Utah, Salt Lake City, UT
Dissertation: *Statistical Growth Modeling of Longitudinal DT-MRI of Early Brain Development*
Mentor: Dr. Guido Gerig

M.S. in Computational Engineering and Science May 2008
University of Utah, Salt Lake City, UT
Thesis: *Automatic Classification of Alzheimer's Disease vs. Frontotemporal Dementia: A Decision Tree Approach with FDG-PET*
Mentor: Dr. Tolga Tasdizen

M.B.A. December 2002
Weber State University, Ogden, UT

B.S. in Computer Science August 2000
Weber State University, Ogden, UT
Magna Cum Laude

Relevant Courses: Machine Learning, Mathematical Modeling, Modeling Biological Networks, Nonparametric Methods, Cellular Physiology, Systems Neuroscience, Neuroanatomy, Scientific

Visualization, Advanced Dynamical Systems, Computational Physics, Biomechanics, Image Processing, and Medical Imaging Systems

EXPERIENCE

Bioinformatics Scientist/Data Scientist (07/2022 – Present)
Kelly Government Solutions
National Institute of Mental Health (NIMH)
Research Focus: Study of the interplay of brain, behavior, and cognition during development. Study of typical development and those at risk for neurodevelopmental disorders such as autism.
Key Accomplishments: Spearheaded a simulation study involving multiple international groups on the interplay of brain, behavior, and cognition.
Duties/Activities: Lead scientific activities with ideas, critical interventions and by organizing and monitoring projects. Serve as a resource for knowledge of advanced statistical and neuroimaging methods for current and new members of the research group. Assist in the design and the development of study protocols. Advise on selection of tools (e.g. data collection management software) for use by the lab. Collaborate with clinicians and other scientists within and outside of the group. Mentor junior lab members.

Bioinformatics Scientist/Data Scientist (08/2020 – 06/2022)
Kelly Government Solutions
National Institute of Mental Health (NIMH)
Research Focus: Investigation of depressive and anxiety symptoms in adolescents with depression before and during the COVID-19 pandemic. Studying association of brain reward circuitry with response to psychotherapy in adolescents with depression.
Key Accomplishments: Publication of our findings on mood and behaviors of adolescents with depression in a longitudinal study before and during the COVID-19 pandemic. Collaborated with scientists inside and outside of NIH which led to multiple publications.
Duties/Activities: Monitored and maintained the quality control, maintenance and appropriate storage and pre-processing of behavioral and imaging data. Collaborated with clinical and scientific staff. Mentored junior trainees in statistical methods.

IRTA Postdoctoral Research Fellow (09/2017- 09/2019)
National Institute of Biomedical Imaging and Bioengineering (NIBIB)
Associate Investigator on the following protocols:
1. Study on Moebius syndrome and other congenital facial weakness disorders
2. Investigation of Juvenile Neuronal Ceroid Lipofuscinosis (CLN3)
3. Characterization of Brain Morphology and Activity Using Functional and Anatomical MRI Contrast
Research Focus: Development and use of advanced MRI and analysis techniques to explore brain anomalies associated with rare disorders such as Juvenile Neuronal Ceroid Lipofuscinosis (CLN3) and Moebius syndrome (MBS) and other congenital facial weakness disorders in children and adults compared to healthy controls. Development of advanced statistical and machine learning techniques to discover imaging biomarkers and genotype-phenotype associations. Interdisciplinary research utilizing technological advances in neuroimaging, genomics, and clinical assessment to examine changes in brain structure and complex phenotypes and behavior.
Key Accomplishments: Managed and directed multiple research projects including investigation of MRI correlates in a multi-site study of healthy children and adults, as well as patients with

neurological disorders. Collaborated with researchers at Harvard Medical School, Mount Sinai, and various institutes within NIH. Initiated an MRI study of Moebius subjects with Mirror Movements to investigate potential aberrant brain pathways involved in the disorder. Presented scientific and technical results of projects to audiences of different backgrounds at local, national, and international conferences, as well as multiple journal publications.
Duties/Activities: Served as a technical expert and provided technical assistance on the use and interpretation of complex statistical and machine learning techniques, and neuroimaging data. Trained and coordinated the work of junior lab members involved in the research study. Involved in the writing and evaluating the technical merit of grants including a research study involving CLN3 and an MRI study of preterm infants. Completed the following continuing education courses and workshops: Deep Learning for Healthcare Image Analysis, The Science of Uncertainty and Data. Practical Bioinformatics (analyzed publicly available genome, expression, and protein data), Bioinformatics for Analysis of Data Generated by Next Generation Sequencing (NGS), and Management Bootcamp.

IRTA Postdoctoral Research Fellow (09/2014 - 09/2017)
National Institute of Child and Human Development (NICHD)
Research Focus: Developed multiple biomedical research projects that involve advanced methodologies to study MRI data, including diffusion-driven tensor-based morphometry (DTBM). Identified new opportunities to apply this quantitative technique to study clinical populations such as patients with hereditary spastic paraplegia, Down syndrome, stroke, traumatic brain injury (TBI), as well as the characterization of normal development and aging. Evaluated microstructural and morphological changes of brain in a healthy population.
Key Accomplishment: Investigated the potential use of this novel technique and evaluated the methodology in scientific studies of human and animal models which led to multiple publications. Examined the sensitivity of MRI metrics and quantitative histology of experimental model of TBI. Managed and provided expertise on statistical analysis and machine learning of MRI studies to explore structural properties of brain pathways in healthy populations. Presented at local and national conferences. NICHD Three-Minute Talks competition semifinalist (2016) and finalist (2017); this competition is for presenting scientific work to non-scientific audiences. Proposed new funding opportunities for postdoctoral fellows.

Research Associate/Junior Postdoctoral Fellow (11/2013 – 09/2014)
Henry M. Jackson Foundation, National Institutes of Health
Research Focus: Led a project that demonstrated the value of acquiring longitudinal scans of pediatric populations providing the ability to separate experimental noise from biological variability.
Key Accomplishment: Implemented methods for the analysis of population studies from multimodal quantitative MRI data, including diffusion MRI. Developed procedures for analysis of scientific data to discover and characterize inadequacies and inconsistencies.
Duties/Activities: Performed searches and created summaries of technical literature. Provided reports on the progress of the research objectives and key results, as well as responses to project inquiries.

Graduate Research Assistant (06/2008 - 11/2013)
Scientific Computing and Imaging Institute, University of Utah
Research Focus: Development of methodologies for hypothesis testing and group comparison among multiple regions of the brain and among groups of healthy subjects and subjects at high risk

of developing autism based on the longitudinal models. In addition, development of methods for prediction of individual trajectories with potential for personalized medicine.
Key Accomplishments: Developed multimodal longitudinal modeling of early human brain development as reflected in conventional MRI and diffusion tensor images (DTI) of subjects from neonate to 2 years old. Published five full length peer-reviewed conference articles and a journal article, presented at local, national, and international conferences.
Duties / Activities: Performed literature review of neuroimaging studies of early neurodevelopment, and initiated new research to address gaps in the field. Conducted image processing and analysis of neuroimaging data, selected methods for quality assessment, and tracked research progress. Served as a graduate student advisory committee member, recruited students and faculties for bioengineering department. Collaborated with faculty from other departments at University of Utah and University of North Carolina.

Lassonde Student Associate (09/2012 - 05/2013)
Lassonde New Venture Development Center, University of Utah
• Evaluated commercialization potential for technologies developed by faculty and staff
• Performed market analysis for a technology to improve public health outcome for pregnant women which led to securing a university grant of $40,000 for the project

Chair (2009-2010) and Vice Chair (2008-2009)
Mountain West Biomedical Engineering Conference, University of Utah
• Designed and organized conference activities for the 5th and 6th annual conferences drawing about 200 attendees including students, fellows, and faculty from the mountain west region to discuss new research in biomedical engineering
• Spearheaded fundraising efforts for the conference and successfully managed budget to be fully funded by the sponsors
• Liaised with biomedical engineering department administrators and faculty on conference activities such as finding potential speakers, review of abstracts, and managing awards. Oversaw design and creation of website, brochure, and conference materials.

Project Manager/Senior Software Engineer (2006 - 2007), RemedyMD, Sandy, UT
• Created project plans including project scope, schedules, goals, tasks, and resources
• Served as a liaison between the business unit and the software development team
• Developed an architecture and service layer for a clinical information system

Senior Software Engineer (2005 - 2006), Net Deposit Inc, Salt Lake City, UT
Designed and implemented a web-based check processing application. Implemented an automated functional test suite.

Programmer/Analyst (2003 - 2005), Intermountain Health Care, Salt Lake City, UT
Designed and developed a web-based patient tracking system and emergency department application. Implemented physician order entry, vital signs, assessment, intervention and discharge charting. Provided technical analysis and requirement gathering for an electronic medication administration record.

Software Engineer (2000 - 2003), **Verticore Technologies, Salt Lake City, UT**
Generated project plans and specifications, architecture, design, implementation, testing and validation of web-based enterprise application for refinery and chemical plant management.

SELECTED PUBLICATIONS

Early Brain Development

Sadeghi, N., Gilmore, J.H., and Gerig, G. (2017). *Twin–singleton developmental study of brain white matter anatomy.* Human Brain Mapping, 38(2), 1009-102.

Sadeghi, N., Gilmore, J.H., Gerig, G. (2015). *Modeling brain growth and development.* In: Brain Mapping: An Encyclopedia Reference: Volume 1: Acquisition Methods, Methods and Modeling.

Sadeghi, N., Prastawa, M., Fletcher, P.T., Wolff, J., Gilmore, J.H., Gerig, G. (2013). *Regional Characterization of longitudinal DT-MRI to study white matter maturation of the early developing brain.* NeuroImage, 68, 236-247.

Clinical Populations

Sadeghi, N., Fors, P.Q., Eisner, L., Taigman, J., Qi, K., Gorham, L.S., Camp, C.C., O'Callaghan, G., Rodriguez, D., McGuire, J., Garth, E.M., Engel, C., Davis M., Towbin K.E., Stringaris A., Nielson, D. M. (2022). *Mood and Behaviors of Adolescents With Depression in a Longitudinal Study Before and During the COVID-19 Pandemic.* Journal of the American Academy of Child & Adolescent Psychiatry, 61(11), 1341-1350.

Gorham, L. S., **Sadeghi, N.**, Eisner, L., Taigman, J., Haynes, K., Qi, K., Camp, C.C., Fors, P., Rodriguez D., McGuire J., Garth E., Engel C., Davis M., Towbin K., Stringaris A., and Nielson, D. M. (2022). *Clinical utility of family history of depression for prognosis of adolescent depression severity and duration assessed with predictive modeling*. Journal of Child Psychology and Psychiatry, 63(8), 939-947.

Sadeghi, N., Hutchinson, E., Van Ryzin, C., Fitzgibbon, E.J., Butman, J.A., Webb, B.D., Facio, F., Brooks, B.P., Collins, F.S., Jabs, E.W., Engle, E.C., Manoli, I., Pierpaoli, C., and Moebius Syndrome Research Consortium (2020). *Brain phenotyping in Moebius syndrome and other congenital facial weakness disorders by diffusion MRI morphometry.* Brain Communications, 2(1), fcaa014.

Raitano Lee, N., Nayak, A., Irfanoglu, M.O., **Sadeghi, N.**, Stoodley, C.J., Adeyemi, E., Clasen, L.S., Pierpaoli, C (2020). *Hypoplasia of cerebellar afferent networks in Down syndrome revealed by DTI-driven tensor based morphometry*. Scientific Reports, 10(1), 1-13.

Gerig, G., Fishbaugh, J., **Sadeghi, N.** (2016). *Longitudinal modeling of appearance and shape and its potential for clinical use.* Medical Image Analysis, 114-121.

MRI Methods

Irfanoglu, M. O., **Sadeghi, N.**, Sarlls, J., and Pierpaoli, C. (2021). Improved reproducibility of diffusion MRI of the human brain with a four-way blip-up and down phase-encoding acquisition approach. *Magnetic Resonance in Medicine*, *85*(5), 2696-2708.

Sadeghi, N., Arrigoni, F., D'angelo, M.G., Thomas, C., Irfanoglu, M.O., Hutchinson, E.B., Nayak, A., Modi, P., Bassi, M.T. and Pierpaoli, C., (2018). *Tensor-based morphometry using scalar and directional information of diffusion tensor MRI data (DTBM): Application to hereditary spastic paraplegia*. Human Brain Mapping, 39(12), 4643-4651.

Hutchinson, E.B.H., Schwerin, S.C., Radomski, K.L., **Sadeghi, N.**, Komlosh, M.E., Irfanoglu, M.O., Juliano, S.L. and Pierpaoli, C., (2018). *Detection and distinction of mild brain injury effects in a ferret model using diffusion tensor MRI (DTI) and DTI-driven tensor based morphometry (D-TBM).* Frontiers in Neuroscience, 12, 573.

Hutchinson, E. B., Schwerin, S. C., Radomski, K. L., **Sadeghi, N.**, Jenkins, J., Komlosh, M. E, Irfanoglu, M.O., Juliano, S. L., and Pierpaoli C. (2017). *Population based MRI and DTI templates of the adult ferret brain and tools for voxelwise analysis.* NeuroImage, 152, 575-589.

Irfanoglu, M.O., Nayak, A., Jenkins, J., Hutchinson E., **Sadeghi, N.**, Thomas C., Pierpaoli, C. (2016). DR-TAMAS: *Diffeomorphic Registration for Tensor Accurate Alignment of Anatomical Structures.* NeuroImage, 132, 439-454

Sadeghi, N., Nayak, A., Walker, L., Irfanoglu, M.O., Albert, P.S., Pierpaoli, C., Brain Development Cooperative Group (2015). *Analysis of the contribution of experimental bias, experimental noise, and inter-subject biological variability on the assessment of developmental trajectories in diffusion MRI studies of the brain*. NeuroImage, 109, 480-492.

Machine Learning and Advanced Statistical Methods

Thomas, C., **Sadeghi, N.**, Nayak, A., Trefler, A., Sarlls, J., Baker, C., and Pierpaoli, C. (2018). *Impact of time-of-day on diffusivity measures of brain tissue derived from diffusion tensor imaging*. NeuroImage, 173, 25-34.

Haber, M., Hutchinson, E., **Sadeghi, N.**, Cheng, W.H., Namjoshi, D.R., Cripton, P.A., Irfanoglu, M.O., Wellington, C.L., Diaz-Arrastia, R., Pierpaoli, C. (2017). *Defining an Analytic Framework to Evaluate Quantitative MRI Markers of Traumatic Axonal Injury: Preliminary Results in a Mouse Closed Head Injury Model.* eNeuro, *4*(5).

Trefler A., **Sadeghi, N.**, Thomas A.G., Pierpaoli, C., Baker, C.I., Thomas, C. (2016). *Impact of time-of-day on brain morphometric measures derived from T1-weighted magnetic resonance imaging.* NeuroImage, 133: 41-52.

Peer Reviewed Full Length Articles in Conference Proceedings

Sadeghi, N., Fletcher, P.T., Prastawa, M., Gilmore, J.H., Gerig, G. (2014). *Subject-specific prediction using nonlinear population modeling: Application to early brain maturation from DTI.* In Proceedings of Medical Image Computing and Computer-Assisted Intervention (MICCAI) 2014, 17(3), 33-40.

Sadeghi, N., Prastawa, M., Fletcher, P.T., Gilmore, J.H., and Gerig, G. (2013). *Multivariate modeling of longitudinal MRI in early brain development with confidence measures.* In Proceedings of the 2013 IEEE International Symposium on Biomedical Imaging (ISBI): From Nano to Macro, 1400-1403.

Sadeghi, N., Prastawa, M., Fletcher, P.T., Gilmore, J.H., Lin, W., and Gerig, G. (2012). *Statistical growth modeling of longitudinal DT-MRI for regional characterization of early brain development.* In Proceedings of the 2012 IEEE International Symposium on Biomedical Imaging (ISBI): From Nano to Macro, 1507-1510.

Sadeghi, N., Prastawa, M., Gilmore, J.H., Lin, W., Gerig, G. (2010). *Towards analysis of growth trajectory through multi-modal longitudinal MR imaging.* In Proceedings of SPIE--the International Society for Optical Engineering, Vol. 7623, 76232U.

Prastawa, M., **Sadeghi, N.**, Gilmore, J.H., Lin, W., Gerig, G. (2010). *A new framework for analyzing white matter maturation in early brain development*. In Proceedings of the 2010 IEEE International Symposium on Biomedical Imaging: From Nano to Macro, 97-100.

Sadeghi, N., Foster, N.L., Wang, A.Y., Minoshima, S., Lieberman, A.P., Tasdizen T. (2008). A*utomatic classification of Alzheimer's disease vs. frontotemporal dementia: a spatial decision tree approach with FDG-PET*. In Proceedings of 2008 IEEE International Symposium on Biomedical Imaging (ISBI): From Nano to Macro, 408-411.

SELECTED PRESENTATIONS

Sadeghi, N., Irfanoglu, M.O., Nayak, A., Thomas, C., Pierpaoli, C. (2016). *Deformation analysis of diffusion tensor data using random forests.* ENAR Spring Meeting. Austin, USA.

Sadeghi, N., Gilmore, J.H., Lin, W., and Gerig, G. (2014). Normative modeling of early brain maturation from longitudinal DTI reveals twin-singleton differences. ISMRM, Milan, Italy.

Sadeghi, N., Prastawa, M., Fletcher, P.T., Gilmore, J.H., Lin, W., and Gerig, G. (2011). *Statistical growth modeling of longitudinal DT-MRI for regional characterization of early brain development*. Medical Image Computing and Computer Assisted Intervention (MICCAI), Workshop on Image Analysis of Human Brain Development. Toronto, Canada.

Sadeghi, N., Prastawa, M., Gilmore, J.H., Lin, W., Gerig, G. (2010). *Spatio-temporal analysis of early brain development*. IEEE Asilomar Conference on Signals, Systems & Computers. USA.