

Matthew Goh

San Francisco, CA

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🌐 <https://mattgoh.github.io>

EDUCATION

Northeastern University

M.S. Bioengineering: Bioimaging and Signal Processing

Boston, MA

2015–2017

University of California, Los Angeles

B.S. Neuroscience

Los Angeles, CA

2008–2012

SKILLS

Programming: Python, MATLAB, SQL, bash/shell, high performance computing

Machine Learning: SVM, PCA, k-means, regression models, CART algorithms, Markov Chains

EXPERIENCE

University of California, San Francisco, Neurology

Research Data Analyst

San Francisco, CA

June 2017 – Present

- Generated brain atrophy-based dementia risk scores using logistic regression and magnetic resonance imaging (MRI) that can predict disease onset in patients with genetic frontotemporal dementia (FTD)
- Developing and maintaining end-to-end neuroimage processing pipelines to transform newly acquired MRI data into feature vectors for machine learning models
- Using CART and mixed models to:
 - Characterize brain atrophy patterns in genetic FTD and associated diseases
 - Improve diagnostic accuracy, specificity, and precision in FTD related syndromes that exhibit heterogeneous, overlapping pathologies and symptoms

Massachusetts General Hospital, Radiology

Graduate Researcher

Boston, MA

Aug 2015 – Jul 2016

- Implemented machine learning classifiers to develop a framework for automated quality assessment of brain MRI segmentations.
- Evaluated efficacy of various feature sets and identified best performing features. Framework includes ability to tune parameters and substitute different machine learning algorithms
- Developed quality assessment module for future deployment and integration of trained model with the *FreeSurfer* brain segmentation software package

USC Laboratory of Neuro Imaging

Programmer Analyst

Los Angeles, CA

Oct 2011 – Jul 2015

- Performed image processing for the calculation of a high-resolution electroencephalographic (EEG) forward head model using finite element analysis. Demonstrated that the omission of trauma-induced neuropathology from the anatomical head model can result in substantial misestimations in EEG lead field focality
- Executed validation studies for new software developed by various institutions for neurotrauma lesion segmentation and cortical shape analysis
- Developed image processing pipelines to integrate and analyze imaging data across modalities (EEG, MRI, DTI, CT) acquired from severe brain injury patients

SELECTED PROJECTS

Robotic Object Tracking for Path Planning

Nov 2016 – Dec 2016

- Designed and built an autonomous self-driving robotic system that executed maneuvers based on visual input and object recognition algorithms. Our team focused on the ability of k-means classification and Canny edge detection to navigate the robot towards a goal object while navigating around avoidance obstacles

Metal Artifact Reduction in Computed Tomography

Jan 2017 – March 2017

- Investigated metal artifact reduction methods in x-ray computed tomography (CT). Developed mathematical models and simulations for CT and investigated existing algorithms such as sinogram interpolation and gradient descent-with-image-segmentation

SELECTED PUBLICATIONS

1. **(Accepted)** HJ Rosen, AM Staffaroni, Y Cobigo, **SYM Goh**, et al. Individualized Atrophy-Based Prediction of Dementia Onset in Familial Frontotemporal Lobar Degeneration. *Alzheimer's & Dementia*
2. **(In Press)** AM Staffaroni, L, Bajorek, KB Casaletto, Y Cobigo, **SYM Goh**, et al. (2019) Assessment of Executive Function Declines in Presymptomatic and Mildly Symptomatic Familial Frontotemporal Dementia: NIH-EXAMINER as a Potential Clinical Trial Endpoint. *Alzheimer's & Dementia*.
3. A Irimia, **SYM Goh**, AC Wade, K Patel, PM Vespa, JD Van Horn (2017) Traumatic Brain injury severity, neuropathophysiology, and clinical Outcome: insights from Multimodal neuroimaging *Frontiers in Neurology*, volume 8, page 530
4. B Wang, M Prastawa, A Irimia, A Sahae, W Liua, **SYM Goh**, PM Vespa, JD van Horn, G Gerig (2016) Modeling 4D pathological changes by leveraging normative models *Computer Vision and Image Understanding*, volume 151, pages 3-13, doi:10.1016/j.cviu.2016.01.007
5. **SYM Goh**, A Irimia, PM Vespa, JD van Horn (2016) "Patient-tailored multimodal neuroimaging, visualization and quantification of human intra-cerebral hemorrhage," in *Medical Imaging 2016: PACS and Imaging Informatics: Next Generation and Innovations*, San Diego, California, doi:10.1117/12.2216150
6. CM Torgerson, A Irimia, **SYM Goh**, JD van Horn (2015) Integration of behavioral, structural, functional and genetic data for the study of autism spectrum disorders *Lecture Notes in Computer Science*, volume 9162, pages 202-207
7. **SYM Goh**, A Irimia, CM Torgerson, MA Tubi, CR Real, DF Hanley, NA Martin, PM Vespa, JD van Horn (2014) Longitudinal quantification and visualization of intracerebral hemorrhage using multimodal magnetic resonance and diffusion tensor imaging *Brain Injury*, volume 29, pages 438-445, doi:10.3109/02699052.2014.989907
8. CM Torgerson, A Irimia, **SYM Goh**, JD van Horn (2014) The DTI connectivity of the human claustrum *Human Brain Mapping*, volume 36, pages 827-1232, doi:10.1002/hbm.22667
9. A Irimia, CM Torgerson, **SYM Goh**, JD van Horn (2014) Statistical estimation of physiological brain age as a descriptor of senescence rate during adulthood *Brain Imaging and Behavior*, volume 9, pages 678-689, doi:10.1007/s11682-014-9321-0
10. A Irimia, **SYM Goh**, CM Torgerson, PM Vespa, JD van Horn (2014) Structural and connectomic neuroimaging for the personalized study of longitudinal alterations in cortical shape, thickness and connectivity after traumatic brain injury *Journal of Neurosurgical Sciences*, volume 58, pages 129-144.
11. **SYM Goh**, A Irimia, CM Torgerson, JD van Horn (2013) Neuroinformatics challenges to the structural, connectomic, functional, and electrophysiological multimodal imaging of human traumatic brain injury *Frontiers in Neuroinformatics*, volume 8, doi:10.3389/fninf.2014.00019
12. A Irimia, **SYM Goh**, CM Torgerson, NR Stein, MC Chambers, PM Vespa, JD van Horn (2013) Electroencephalographic inverse localization of brain activity in acute traumatic brain injury as a guide to surgery, monitoring and treatment *Clinical Neurology and Neurosurgery*, volume 115, pages

2159–2165, doi:10.1016/j.clineuro.2013.08.003

13. A Irimia, **SYM Goh**, CM Torgerson, MC Chambers, R Kikinis, JD van Horn (2013) Forward and inverse electroencephalographic modeling in health and in acute traumatic brain injury *Clinical Neurophysiology*, volume 124, pages 2129-2145, doi:10.1016/j.clinph.2013.04.336
14. **SYM Goh**, A Irimia, CM Torgerson, R Kikinis, PM Vespa, JD van Horn (2013) “High-resolution electroencephalographic forward modeling in traumatic brain injury using the finite element method,” in *2013 IEEE 10th International Symposium on Biomedical Imaging*, San Francisco, CA, USA.

ACTIVITIES AND SOCIETIES

Gordon Institute of Engineering Leadership

2015 – 2016

Gordon Fellow

UCLA Philharmonia Orchestra

2007 – 2008

Violist