

## James R. Golden

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### SUMMARY

#### Deep learning for medical imaging:

- DICOM MRI image and volume data manipulation.
- MRI super resolution with deep 3D resnet using perceptual loss on volume data.

#### Computational modeling for vision:

- CNNs for classification/object id, analysis of selectivity/invariance; U-nets for bounding boxes.
- Reconstruction of visual perception with a retinal prosthesis.
- Large-scale simulation of primate visual system processing, from optics to spikes.

#### Scientific computing:

- Python, Pytorch, Tensorflow/Keras, Matlab.

#### Software development:

- As a postdoc and data scientist, worked with teams, built github codebases, regular code reviews.

### WORK EXPERIENCE

#### Consulting, data science (3/2018 - present): HITactics, machine learning.

- Deep learning for projects including supply chain optimization, bluetooth localization.
- Supply chain: used shipping database to train a deep network with Pytorch, resulted in large improvements in prediction accuracy of six key milestone events in shipping chain.
- Localization: deep network approach that improved on conventional trilateration localization.

#### Postdoctoral Scholar (2015 - 2017): Stanford Neurosurgery & Image Systems Engineering.

- Built computational models using physiological data to simulate the eye and visual system.
- Simulated perception with a retinal prosthesis and quantified perceptual fidelity.
- Developed transparent and efficient codebase collaboratively on github.

#### Graduate Research Assistant (2009 - 2015): Cornell Psychology, Computational Neuroscience.

- Sparse coding networks for efficient coding simulating primate ventral visual stream processing.
- Neurophysiological data analysis for vision and audition in the jumping spider and dragonfly.

#### Patent Examiner (2005 - 2007): United States Patent and Trademark Office.

#### NSF REU (6/2004 - 8/2004): Colorado State University, Electrical and Computer Engineering.

### EDUCATION

#### Stanford University, Palo Alto, CA.

Postdoctoral Scholar:

- School of Medicine (Neurosurgery, Ophthalmology); Hansen Experimental Physics Laboratory
- Stanford Center for Image Systems Engineering (SCIEN)

Advisors: EJ Chichilnisky and Brian Wandell. August 2015 - October 2017.

#### Cornell University, Ithaca, NY.

Ph.D., Psychology: Computational Neuroscience. Advisor: David J. Field. August 2015.

M.Eng., Electrical & Computer Engineering: Signal and Image Processing. May 2009.

#### Swarthmore College, Swarthmore, PA.

B.S., Major in Engineering, Minor in Philosophy. May 2005.

### PUBLICATIONS

Golden, JR, Erickson-Davis, C, Cottaris, NP, Parthasarathy, N, Rieke, FM, Brainard, DH, Wandell, BA, Chichilnisky, EJ (2018). Simulation of visual perception and learning with a retinal prosthesis. bioRxiv, 206409 (**accepted**, *Journal of Neural Engineering*).

Golden, JR, Vilankar, KP, Wu, MCK, Field, DJ. (2016) Conjectures on the nonlinear geometry of visual neurons. *Vision Research*.

Golden, JR. (2015) A unified approach to the nonlinearities of visual neurons: the curved geometry of neural response surfaces. *Cornell University Dissertation*.

Golden, JR. (2005). Clutter mitigation in weather radar systems filter design & analysis. *Proceedings of the Thirty-Seventh Southeastern Symposium on System Theory (pp. 386-390), IEEE*.

Jiang, H, Cottaris, N, Golden, JR, Brainard, D, Farrell, J and Wandell, B. (2017) Simulating retinal encoding: factors influencing Vernier acuity. *Human Vision & Electronic Imaging*, bioRxiv.

Shamble, PS, Menda, G, Golden, JR, Nitzany, EI, Walden, K, Beatus, T, Elias, DO, Cohen, I, Miles, RN and Hoy, RR. (2016) Airborne acoustic perception by a jumping spider. *Current Biology*.

Field, DJ, Golden, JR, Hayes, AJ. (2014). Contour integration and the association field. In JS Werner, LM Chalupa (Eds.), *The New Visual Neurosciences*. Cambridge: The MIT Press.

Vilankar, KP, Golden, JR, Chandler, DM, Field, DJ. (2014). Local edge statistics provide information regarding occlusion and non-occlusion edges in natural scenes. *Journal of Vision*.

Menda, G, Shamble, PS, Nitzany, EI, Golden, JR, Hoy, RR. (2014). Visual perception in the brain of a jumping spider. *Current Biology*.

Nitzany, EI, Menda, G, Shamble, PS, Golden, JR, Hoy, RR, Victor, JD. (2017). Evolutionary convergence in computation of local motion signals in monkey and dragonfly. bioarxiv, 240101.

## WORKSHOPS

**Computational Neuroscience: Vision** (July 1-15, 2016).  
Hosted by Cold Spring Harbor Laboratory.

**Summer Workshop on the Dynamic Brain** (August 7-21, 2014).  
Hosted by the Allen Institute for Brain Science, UW Friday Harbor Laboratory.  
Awarded best data visualization for “Layer-Specific Cortical Projections in the Mouse Brain”.

**Summer Workshop on Mining and Modeling of Neuroscience Data** (July 3-15, 2012).  
Hosted by the Redwood Institute for Theoretical Neuroscience, UC Berkeley.

## AWARDS AND AFFILIATIONS

**Telluride Association**, Cornell University Branch Member, 2010-2013.

**Tau Beta Pi**, Engineering Honor Society, Pennsylvania Kappa Chapter.

**IEEE Student Paper Contest Winner** for *Clutter mitigation in weather radar systems...*, 2005, Region 2 (PA, NJ, OH, DE, VA, WV, DC).