

## Research Interests

### Machine Learning and Deep Learning

Experiments and theory to provide interpretability to deep architectures which guide principled architectural innovations .

## Education

### Cornell University and Google Brain

PhD. in Computer Science

New York and Mountain View, USA

Aug. 2014 — present

### University of Cambridge (Trinity College)

BA and Masters in Mathematics. First Class Honours

Cambridge, UK

Oct. 2010 — June 2014

## Research and Industry Experiences

### UC Berkeley, Simons Institute

Foundations of Machine Learning Workshop

Invited participant for workshop on better understanding fundamentals of machine learning.

Visiting Student

January 2017 – June 2017

### Stanford University

with Surya Ganguli

Understanding fundamentals of deep neural networks and connections to neuroscience

Visiting Researcher

June 2016 –

### Google Inc., Brain Team

with Jascha Sohl-Dickstein and Ian Goodfellow

Working on experiments and theory to provide greater understanding and interpretability in deep neural networks.

Research Resident

January 2016 – present

### Google Inc., Strategic Technologies

with Andrew Tomkins, Ravi Kumar and Tamas Sarlos

Predicting user trails (website visits, song listens, location checkins) with Markov models and LSTMs

Research Intern

May 2015 – August 2015

### Brown University

with Eli Upfal

Developed and analysed a random sampling procedure that could greatly reduce the amount of metadata storage required during garbage collection in flash memory.

Visiting Researcher

July 2013 – September 2013

### Tata Institute of Fundamental Research

with C.S. Rajan

Scholarship student at summer school aimed at exposing students to advanced mathematics. Studied Galois Theory and Elliptic Curves.

Visiting Scholar

June 2012 – August 2012

## Selected Awards

### HHMI Janelia Visiting Scholarship

Awarded on merit of research in deep neural networks, to facilitate participation in workshop in Machine Learning.

2016

### Cornell PhD McMullen Fellowship

Awarded to excellent incoming graduate students.

2014 — 2015

### Rouse Ball Essay Prize

Awarded for excellent dissertation essay on properties of Random Walks on Graphs.

2013

<b>Trinity College Cambridge Senior Scholarship</b>	2013
Awarded for outstanding results in University of Cambridge Part II Examinations.	
<b>China Girls Maths Olympiad</b>	2010
One of a team of four representing United Kingdom at an international Olympiad.	
<b>British Mathematical Olympiad: Gold Medals</b>	2009 — 2010
Top (nationally) twenty and top ten, 2009, 2010	

## Publications

### SVCCA for Deep Understanding and Improvement

Maithra Raghu, Justin Gilmer, Jason Yosinski, Jascha Sohl-Dickstein 2017  
Neural Information Processing Systems 2017

### On the expressive power of deep neural networks

Maithra Raghu, Ben Poole, Jon Kleinberg, Surya Ganguli, Jascha Sohl-Dickstein 2017  
In International Conference on Machine Learning 2017. Also appeared in Janelia Workshop in Machine Learning and Computer Vision, BayLearn 2016, Research@Google, NIPS Interpretable Machine Learning Workshop 2016, Women in Machine Learning (WiML) 2016.

### Explaining the Learning Dynamics of Direct Feedback Alignment

Justin Gilmer, Colin Raffel, Sam Schoenholz, Maithra Raghu, Jascha Sohl-Dickstein 2017  
In International Conference on Learning Representations (ICLR) Workshop 2017

### Exponential expressivity in deep neural networks through transient chaos

B Poole, S Lahiri, M Raghu, J Sohl-Dickstein, S Ganguli 2016  
In Neural Information Processing Systems (NIPS) 2016

### Linear Additive Markov Processes

with Tamas Sarlos, Ravi Kumar and Andrew Tomkins (alphabetical order) 2016  
WWW 2017

### Team Performance with Test Scores

Jon Kleinberg, Maithra Raghu (alphabetical order) 2015  
In Economics and Computation (EC) 2015. Invited for submission to the journal ACM Transactions on Economics and Computation (TEAC).

### Random Walks on Graphs

Dissertation (Trinity College)

Maithra Raghu 2013  
Entered and won Cambridge Rouse Ball Essay prize.

## Invited Talks

**OpenAI** 2017

Interpreting Deep Representations

**International Conference on Machine Learning** 2017

Expressivity of Deep Networks

**REWORK: Deep Learning Summit** 2017

Neural Network Learning Dynamics

**World Wide Web Conference** 2017

Modelling Sequential Data with Linear Additive Markov Processes

**DeepMind** 2016

Better interpretability for deep networks.

**NIPS Workshop: Women in Machine Learning (WiML)** 2016

**New York University** 2016

<b>Northstar Science Film Panel for Arrival</b> Success of modern methods of machine translation, and women in STEM	2016
<b>Janelia Workshop on Machine Learning and Computer Vision</b> Interpreting results from Deep Neural Architectures	2016
<b>Economics and Computation</b> Evaluating Team Performance with Tests	2015

## Professional Activities

### Workshop Organization

<b>NIPS Workshop: Deep Learning: Bridging Theory and Practice</b> Co-organizing NIPS workshop looking at a systematic exploration of phenomena observed with deep neural networks.	2017
<b>Women in Machine Learning (WiML) Organizer</b> Co-located with NIPS, this workshop brings together hundreds of leading women and men machine learning researchers, and displays top peer-reviewed results in Machine Learning by female researchers. Organizers are vetted by leading women ML researchers.	2015

### Peer Review

<b>International Conference on Learning Representations (ICLR)</b>	2018
<b>Women in Machine Learning (WiML)</b>	2017
<b>Neural Information Processing Systems (NIPS)</b>	2017
<b>International Conference on Machine Learning (ICML)</b>	2017
<b>International Conference on Learning Representations (ICLR)</b>	2017
<b>Neural Information Processing Systems (NIPS)</b>	2016
<b>Women in Machine Learning</b>	2015

### Misc.

<b>Ask Me Anything Reddit (r/machinelearning)</b> with the Google Brain Team, answering questions on Machine Learning and Deep Learning, and academia and industry	2016
<b>Cambridge University Mathematics Society</b>	2013 – 2014
<b>United Kingdom Mathematics Trust, Senior Mentor</b> Mentored talented students for the national mathematical olympiads	2010 – 2012