Ramprasaath R. Selvaraju

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Research Interests

Computer Vision, Interpretability, Reasoning, Vision and Language, Self-Supervised Learning.
I work on developing algorithms to make AI Interpretable, Transparent and Unbiased

Employment

Salesforce Research, Palo Alto — 2020 - now
Senior Research Scientist

Education

Georgia Institute of Technology, Atlanta — 2015 - 2020
Ph.D in Computer Science (Transferred from Virginia Tech in 2017)
Dissertation Title: *Explaining Model Decisions and Correcting them via Human Feedback*

Birla Institute of Technology & Science (BITS)-Pilani — 2010 - 2015
Bachelor of Engineering (Honor) in Electrical and Electronics
Master of Science (Honor) in Physics

Internships

Microsoft Research, Seattle — Summer 2019
With Ece Kamar, Besmira Nushi and Eric Horvitz
Towards evaluating and encouraging human-like reasoning abilities in deep models.

Tesla Autopilot, Palo Alto — Spring 2019
With Andrej Karpathy
Preventing failures of autonomous systems in case of rarely occurring scenarios.

Samsung Research America, Mountain View — Summer 2018
With Yilin Shen and Hongxia Jia
Developing algorithms for grounding and unbiasing deep vision and language models.

Facebook, Menlo Park — Spring 2017
With Peter Vajda and Devi Parikh
Developing a framework for interpreting and visualizing Facebook's deep models.

Virginia Tech, Blacksburg — Spring 2015
With Devi Parikh
Building curious systems that ask natural language questions about an image.

Oxford University, Oxford — Fall 2014
With Philip H.S Torr and Stephen Hicks
Developing interactive augmented reality system for visually impaired users.

Brown University, Providence — Summer 2013
With Benjamin Kimia
Designing a vision-based navigation system to help visually impaired people navigate through indoor environments.

Journal Articles

Grad-CAM: Visual Explanations from Deep Networks via Gradient-based Localization
R.R. Selvaraju, M. Cogswell, A. Das, R. Vedantam, D. Parikh, and D. Batra
International Journal of Computer Vision (IJCV), 2019.

Reframing Explanation as an Interactive Medium: The EQUAS (Explainable QUestion Answering System) Project
D. Batra, W. Ferguson, R. Mooney, D. Parikh, A. Torralba, D. Bau,D. Diller, J. Fasching, J. Kaufman, Y. Goyal , J. Miller, K. Moffitt, A. Oca, **R.R. Selvaraju**, A. Shrivastava, J. Wu
Applied AI Letters, 2021.

Conference Papers

Align before Fuse: Vision and Language Representation Learning with Momentum Distillation
J. Li, **R.R. Selvaraju**, A. Gotmare, S. Joty, C. Xiong, S.Hoi
Neural Information Processing Systems (NeurIPS), 2021.

SOrT-ing VQA Models : Contrastive Gradient Learning for Improved Consistency
S. Dharur, P. Tendulkar, D. Batra, D. Parikh, **R.R. Selvaraju**
North American Chapter of the Association for Computational Linguistics (NAACL), 2021.

CASTing Your Model: Learning to Localize Improves Self-Supervised Representations
R.R. Selvaraju*, K. Desai*, J. Johnson, N. Naik
Computer Vision and Pattern Recognition (CVPR), 2021.

SQuINTing at VQA Models: Interrogating VQA Models with Sub-Questions
R.R. Selvaraju, P. Tendulkar, D. Parikh, E. Horvitz, M. Ribeiro, B. Nushi, and E. Kamar
Computer Vision and Pattern Recognition (CVPR), 2020.

Taking a HINT: Leveraging Explanations to Make Vision & Language Models More Grounded
R.R. Selvaraju, S. Lee, Y. Shen, H. Jia, S. Ghosh, L. Heck, D. Batra, and D. Parikh
International Conference on Computer Vision (ICCV), 2019.

Trick or TReAT: Thematic Reinforcement for Artistic Typography
P. Tendulkar, K. Krishna, **R.R. Selvaraju** and D. Parikh.
International Conference on Computational Creativity (ICCC), 2019.

Choose Your Neuron: Incorporating Domain Knowledge into Deep Networks via Neuron Importance
R.R. Selvaraju*, P. Chattopadhyay*, M. Elhoseini, T. Sharma, D. Batra, D. Parikh, and S. Lee
European Conference on Computer Vision (ECCV), 2018.

Diverse Beam Search: Decoding Diverse Solutions from Neural Sequence Models
A. Vijayakumar, M. Cogswell, **R.R. Selvaraju**, Q. Sun, S. Lee, D. Crandall, and D. Batra
Association for the Advancement of Artificial Intelligence (AAAI), 2018.

Grad-CAM: Visual Explanations from Deep Networks via Gradient-based Localization
R.R. Selvaraju, M. Cogswell, A. Das, R. Vedantam, D. Parikh, and D. Batra
International Conference on Computer Vision (ICCV), 2017.

Counting Everyday Objects in Everyday Scenes
P. Chattopadhyay, R. Vedantam, **R.R. Selvaraju**, D. Batra, and D. Parikh. *Computer Vision and Pattern Recognition (CVPR), 2017.*

The Semantic Paintbrush: Interactive 3D Mapping and Recognition in Large Outdoor Spaces
M. Ondrej, V. Vineet, M Lidegaard, **R.R. Selvaraju**, M. Niener, S. Golodetz, S. Hicks, P. Prez, S. Izadi, and P. Torr.
ACM Conference on Human Factors in Computing Systems (CHI), 2015.

Automated Colorimetric Analysis in Paper-based Sensors
S. Garg, **R.R. Selvaraju**, S. Kapur, and K. Rao
International Conference on Image Processing (ICIP), 2014.

Workshop Papers

SOrT-ing VQA Models : Contrastive Gradient Learning for Improved Consistency
S. Dharur, P. Tendulkar, D. Batra, D. Parikh, **R.R. Selvaraju**
NeurIPS'20 Workshop on Interpretable Inductive Biases.

Taking a HINT: Leveraging Explanations to Make Vision & Language Models More Grounded
R.R. Selvaraju, S. Lee, Y. Shen, H. Jia, S. Ghosh, D. Batra, and D. Parikh
ICLR'19 Workshop on Debug ML.

Choose Your Neuron: Incorporating Domain Knowledge into Deep Networks via Neuron Importance
R.R. Selvaraju*, P. Chattopadhyay*, M. Elhoseini, T. Sharma, D. Batra, D. Parikh, and S. Lee
NeurIPS'18 Workshop on Continual Learning and NeurIPS'18 VIGIL Workshop.

Grad-CAM: Why did you say that?
R.R. Selvaraju, M. Cogswell, A. Das, R. Vedantam, D. Parikh, and D. Batra
NeurIPS'16 Workshop on Interpretable ML and CVPR'17 Workshop on Explainable Computer Vision.

Invited Talks

Explaining Model Decisions and Correcting them via Human Feedback
Towards Robust, Trustworthy, and Explainable Computer Vision ICCV'21 Tutorial

Visualizing and Understanding CNNs
Deep Learning Lecture at *Fall 19, 20, 21*

Towards Interpretable, Transparant and Unbiased AI
Microsoft AI Breakthroughs *Fall 18*

Teaching

Data Structures and Algorithms ***Fall 15 - Spring 16***
Teaching Assistant

Towards Robust, Transparent and Explainable Computer Vision ICCV'21
Tutorial Organizer

Technical Skills

Languages : Python, MATLAB, C++, HTML
Deep Learning Frameworks : PyTorch, Tensorflow, Caffe, Torch

Side Projects

Interpreting decisions from Deep RL agents trained for navigation — Fall 2020

Weak supervision and Generative models for semantic segmentation — Spring 2018

Exploring Curriculum Learning for deep models — Spring 2015

Relevant Courses

- Math Foundations of ML
- Adv. Computer Vision
- Adv. Machine Learning
- Deep Learning
- Optim. in High-dim
- Bayesian Statistics
- Prob. and Statistics
- Human Robot Interaction
- Linear Algebra

Reviewing

IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)	2018
Computer Vision and Image Understanding (CVIU) Journal	2019
Computer Vision and Pattern Recognition (CVPR)	2017, 2018, 2019, 2020, 2021
Neural Information Processing Systems (NeurIPS)	2016, 2017
European Conference on Computer Vision (ECCV)	2018, 2020
IEEE International Conference on Computer Vision (ICCV)	2017,2019,2021
International Conference on Robotics and Automation (ICRA)	2021

Extra Curricular

First Place, Divisionals and Second, Mid-Atlantic Table-Tennis Championship — 2016
Represented Virginia Tech, US-Canada National Table-Tennis Championship — 2016

References

Dr. Devi Parikh, Associate Professor, Georgia Tech - parikh@gatech.edu
Dr. Dhruv Batra, Associate Professor, Georgia Tech - dbatra@gatech.edu
Dr. Nikhil Naik, Lead Research Scientist, Salesforce Research - nnaik@salesforce.com
Dr. Ece Kamar, Senior Principal Research Area Manager, Microsoft Research - eckamar@microsoft.com
Dr. Stefan Lee, Assistant Professor, Oregon State University - leestef@oregonstate.edu
Dr. Mohamed Elhoseiny, Assistant Professor, King Abdullah University of Science and Technology - mohamed.elhoseiny@kaust.edu.sa