# Nirbhay Modhe

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| **CONTACT** | PhD Student, advised by Prof. Dhruv Batra     email: nirbhaym@gatech.edu |
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**EDUCATION**

**Georgia Tech**, PhD in Computer Science — 2017-present

**IIT Kanpur**, B. Tech in Computer Science, CGPA: 9.7/10 — 2013-2017

**PUBLICATIONS**

**Nirbhay Modhe\***, Harish Kamath\*, Dhruv Batra, Ashwin Kalyan. Model-Advantage and Measuring Generalization in Reinforcement Learning *To be submitted*

**Nirbhay Modhe**, Prithvijit Chattopadhyay, Mohit Sharma, Abhishek Das, Devi Parikh, Dhruv Batra, Ramakrishna Vedantam. IR-VIC: Unsupervised Discovery of Sub-goals for Transfer in RL *International Joint Conference on Artificial Intelligence, Yokohoma, Japan, 2020* (**IJCAI20** ⬀ , **arXiv** ⬀ )

Vikas Jain\*, **Nirbhay Modhe\***, Piyush Rai. Scalable Generative Models for Multi-label Learning with Missing Labels. *International Conference on Machine Learning (ICML),* 2017 (**pdf** ⬀ )

**RESEARCH EXPERIENCE**

**Georgia Tech**, Prof. Dhruv Batra & Prof. Devi Parikh
Towards Smarter Q-Bots in Visual Dialog (**video** ▶ **, pres** ⬀ )
- Explored ways of making the Questioner Bot ask more discriminative questions in the visual dialog task where two agents play a cooperative image-guessing game

**IIT Kanpur**, *Prof. Amitabha Mukerjee*
Reconstructing Unique Inversions for Deep Model of Motion
- Extended the Convolutional Chair Generation model by Dosovitsky et. al. for reconstructing poses of a 3 DOF robotic arm.
- Obtained a labelled dataset of the CRS Robot Arm using 6 cameras and used the proposed CNN to learn the robot image representations.

**IIT Kanpur**, *Prof. Raghunath Tewari*
Probabilistic Polynomial Method in Circuit Complexity
- Studied the application of the probabilistic polynomial method by Ryan Williams in the All Pairs Shortest Path and Boolean Orthogonal Detection problem.
- Proposed the application of this method to solve min-plus matrix multiplication faster by using the tensor product decomposition of the two matrices.

**INTERNSHIPS**

**SRI International**, Giedrius Burachas — Summer 2018
Stochastic Video Prediction for Navigation
- Applied disentangled representations for stochastic video prediction in a virtual Unity3D environment and the KITTI dataset.

**University of Texas at Dallas**, *Prof. Vincent Ng* — Summer 2016
Event Coreference Resolution
- Explored the use of recurrent neural networks for event coreference resolution

**TEACHING EXPERIENCE**

**Teaching Assistant**, Deep Learning, Georgia Tech
- Served as TA for CS 7643/4803 in Fall 2018 and Fall 2019.
- Gave an introductory lecture on dynamic programming methods for solving MDPs and an introduction to Reinforcement Learning in Fall 2019. (**RL slides pdf** ⬀ )

**Tutor**, Fundamentals of Computing (ESC101), IIT Kanpur
- Taught in weekly tutorial classes for ESC101 in Fall 2016 and Spring 2017.
- Recorded video lectures in Hindi and partly in English as a part of the course offering to aid students sturggling with understanding English. **(YouTube playlist ⧉ )**

**OPEN SOURCE**

**VisDial-RL in PyTorch**, Prof. Dhruv Batra                                July 2018
**batra-mlp-lab/visdial-rl** ⧉
- Lead the open source project for implementing VisDial RL - *Learning Cooperative Visual Dialog Agents using Deep Reinforcement Learning* by Das and Kottur et. al., 2017, in PyTorch. **(Github ⧉ )**

**COURSE PROJECTS**

**Generative Image Modelling using DRAW**            July '16 - November '16
*Recent Advances in CV, Prof. Gaurav Sharma*                        **(code ⌂ )**
- Analysed the generative RNN model "DRAW" by Gregor et. al. by experimenting with the parameters and design choices of the enocder-decoder framework on the MNIST and Street View House Numbers (SVHN) cropped dataset.
- Implemented and evaluated three new modifications to DRAW which incorporate convolutional features, supervised learning and fully convolutional networks on the MNIST dataset.

**Image Colorization by Patch Inference**                  Jan '16 - April '16
*Computer Vision, Prof. Vinay Namboodiri*                          **(code ⌂ )**
- Implemented and evaluate a novel image colorization model inspired by the idea of "Fast Direct Super-resolution by Simple Functions" by Yang et. al. The model learns to color images by training on the luminance and chrominance values of local patches.
- Evaluated the model on a set of scene images from the Sun Database.

**Word Sense Disambiguation in Hindi**                    March '15 - April '15
*Artificial Intelligence,Prof. Amitabha Mukerjee*                   **(code ⌂ )**

**Perl Compiler**                                          Jan '16 - April '16
*Compiler Design, Prof. Subhajit Roy*                              **(code ⌂ )**

**ACADEMIC ACCOLADES**
- Received **Academic Excellence Award** twice for outstanding academic performance (awarded to top 7% students in the institute) from 2013-15
- Received an **A\* grade** in 8 courses (awarded to top 1-2% students in a course)
- Secured **All India Rank 414** (among 150,000 students) in JEE Advanced 2013
- Secured **All India Rank 313** (among 5,000,000 students) in JEE Mains 2013

**REVIEWING**    Served as a reviewer for ECCV 2018, CVPR 2019, ICLR 2019, ICLR 2020, AAAI 2020, NeurIPS 2020.

**TECHNICAL SKILLS**    Languages : Python, BASH, C, C++, R, Matlab/Octave
Software & Tools : PyTorch, TensorFlow, LaTeX, Git