# Nirbhay Modhe


**CONTACT**

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**EDUCATION**

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

**IIT Kanpur**, Bachelor of Technology in Computer Science — 2013-2017

**RESEARCH EXPERIENCE**

**Georgia Tech**, Prof. Dhruv Batra & Prof. Devi Parikh — Aug 17' - Nov '17
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

**University of Texas at Dallas**, *Prof. Vincent Ng* — May '16 - July '16
Event Coreference Resolution

- Explored the use of recurrent neural networks for event coreference resolution

**IIT Kanpur**, *Prof. Amitabha Mukerjee* — May '15 – August '15
Reconstructing Unique Inversions for Deep Model of Motion **(report)**

- 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* — Dec '15 - April '16
Probabilistic Polynomial Method in Circuit Complexity **(pres, report)**

- 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.

**PUBLICATIONS**

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

**COURSE PROJECTS**

**Generative Image Modelling using DRAW** — July '16 - November '16
*Recent Advances in CV, Prof. Gaurav Sharma* **(code, pres, report)**

- 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.

**Sentence Level Grammatical Error Identification** — July '16 - November '16
*Intro to Natural Language Processing, Prof. Harish Karnick* **(report)**

- Worked on identifying sentence level grammatical errors (those arising from missing or incorrectly placed words) using a RNN model on the NUCLE corpus of the CoNLL-2013 shared task. Error identification was also performed on the NIPS 2015 dataset.
- Evaluated a RNN model which uses lexical features to either identify regions in a sentence where a gramamtical error might be present, or identify exactly which error (insertion, deletion or replacement) exists in a particular region of a sentence.

**Image Colorization by Patch Inference** Jan '16 - April '16
*Computer Vision, Prof. Vinay Namboodiri* **(code , poster , report )**

- 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.

**Object Tracking in Surveillance Videos** Jan '16 - April '16
*Machine Learning Tools, Prof. Harish Karnick* **(pres , report )**

- Adapted the tracking model by Sam Hare in his paper "Structured Output and Tracking with Kernels" for use in the IIT Kanpur Surveillance Video Dataset, 2016.
- Performed classification of the localized objects using various classification algorithms such as Random Forest, AdaBoost with stumped decision trees and linear SVM.

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

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

**NachOS** July '15 - Nov '15
*Operating Systems, Prof. Mainak Chaudhuri*

## TEACHING EXPERIENCE

**Fundamentals of Computing**, Tutor *Semester I and II, 2016-17*

- Taught in weekly tutorial classes, devised and graded lab exams, supervised weekly lab sessions, for two consecutive semesters.

**Fundamentals of Computing**, Academic Mentor, Counselling Service *2014-15*

- Mentored academically deficient students in the course ESC101 (Fundamentals of Computing) through personal tutoring and doubt clearing sessions.

## 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

## TECHNICAL SKILLS

Languages : Python, C, C++, R, BASH, Perl
Software & Tools : TensorFlow, Theano, Caffe, Matlab/GNU Octave, LaTeX, Git

## OFFICIAL POSITIONS

**Group Leader**, Rubik's Cube Hobby Group, IIT Kanpur *2015-16*

- Held workshops for various puzzles such as the Rubik's Cube, 4x4x4 cube, 5x5x5 cube, 2x2x2, Pyraminx and Megaminx
- Coordinated all Blindfolded Rubik's Cube Solving projects done by first year students in the summer of 2015

**Event Coordinator**, IORC (Indian Open Rubik's Cube) *March '15*

- Appointed judges for all events as well as invigilated over all of them
- Acted as a judge for timing individual solves and provided official scrambles for puzzles

**Student Guide** at Counselling Service, IIT Kanpur *2014-15*

- Helped 7 freshmen adjust to campus life on their arrival to campus, provided emotional support and academic guidance to them during their first year