

# Mohan Bhambhani | CS13B036

Indian Institute of Technology Madras

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## Education

### Indian Institute of Technology Madras

Dual Degree(B.Tech.+M.Tech.) in Computer Science and Engineering; CGPA: 8.86/10

Chennai, India

2013-2018\*

### Silver Bells School

Class XII - Gujarat state board; Percentile: 99.14%

Bhavnagar

2013

### Saint Mary High School

Class X - Gujarat state board; Percentile: 99.19%

Bhavnagar

2011

## Professional Experience

### Research Internship: Purdue University

Guide: Prof. Jennifer Neville

West Lafayette, USA

May 2017 - July 2017

- Performed Bias-variance decomposition for node2vec. Observed that bias is high.
- Used many other sampling methods to unbiased the model. Increasing the sampled data from the network didn't help.
- Observed that bias is high for low degree nodes from degree-wise bias-variance analysis.

### Development Internship: Microsoft

Mentor: Mohammad Imran Siddique

Hyderabad

May 2016 - July 2016

- Enabled indexing and code search for GitHub repositories on VSTS.
- This was done using 2 ways. First, obtained search results directly from GitHub and showed on VSTS interface.
- Second, obtained the tree structure of repo and added each blob to indexing queue of VSTS. For continuous indexing, a GitHub webhook was set, which notifies on a push. Re-indexed the changed files when notified.

### Development Internship: Amazon

Mentor: Satishkumar Shanmugasundaram

Chennai

May 2015 - July 2015

- Provided automated assistance to convert code implementing one apk to other using static code analysis.
- Constructed a step-by-step procedure to confirm the automatically detected changes for code migration.
- The plugin would also provide possible fixes for run-time errors from past experiences of others.

## Academic Projects

### Network representation learning

Dual Degree Project : Prof. Balaraman Ravindran

IIT Madras

June 2017 - ongoing

- To get representation of nodes and if required edges for the network. Data can be represented using network in many places for better interpretation (eg. Knowledge graph for text, scene graph for image, network from tags of images for search).

### Scene graph generation from images

Topics in Deep Learning : Prof. Mitesh Khapra

IIT Madras

Aug 2017 - ongoing

- Given a image find all the objects and relationships between them.
- Using the relationships found made a knowledge graph of the image. This will capture the complex interactions between the objects.
- Used the scene graph for visual question answering.

### Deep Driving in TORCS

Deep Learning : Prof. Mitesh Khapra

IIT Madras

Jan 2017 - May 2017

- Made a End-to-End (DL+RL)bot that plays TORCS. This can potentially be extended to real world scenarios.
- The task was broken into two parts. One, to get some features (eg. distance to car ahead) from the game at some intervals using VGGNet. Introduced new features and on the existing features our model out-performed the baseline.
- Second, to pass these features to a RL bot which makes driving decisions. This was trained using DDPG. To our best of knowledge this was the first model to be trained on city-like traffic. Demo- <http://youtu.be/VjgvedEabZw>

### Context Sensitive Spell Checker

Natural Language Processing : Prof. Sutanu Chakraborti

IIT Madras

Aug 2016 - Nov 2016

- Designed a spell checker which works at 3 levels namely word, phrase and sentence, based on a noisy channel model. The performance of our model was **the best in class**.

<sup>1</sup>ongoing.

\*Theory & lab courses

## Building model smarter than an 8th grader

IIT Madras

Natural Language Processing : Prof. Sutanu Chakraborti

Aug 2016 - Nov 2016

- Build a model using Lucene on an multiple-choice Question-Answering test designed for 8th grade science students.
- A set of 8<sup>th</sup> standard books were taken as corpus. Information retrieval techniques were then applied on this.
- Added Query expansion using word2vec similarity to pipeline. Accuracy obtained - 61%. Dataset - AI2 8th Grade Science Questions. Our model outperformed the leaders of the competition- [The Allen AI science Challenge](#).

## Super-scalar processor design

IIT Madras

Computer System Design: Prof. Madhu Mutyam

Aug 2016 - Nov 2016

- Designed a super-scalar processor simulator, using the Tomasulo algorithm. that handles all out-of-ordering of instructions. It also handled all the possible hazards.

## JOS OS

IIT Madras

Operating Systems : Prof. Chester Ribeiro

Aug 2015 - Nov 2015

- Built a primitive operating system which can run simple commands in a shell.
- It mainly included Booting, Memory management, user environment, preemptive multi-tasking, file system and shell.

## Calendar app

IIT Madras

Advanced Programming lab

Jan 2015 - May 2015

- An java applet in JavaFx to schedule tasks depending on the deadline, priority and gain of the task. Integrated the app with CSE moodle to retrieve assignments as tasks and schedule them.

## Chess engine

IIT Madras

Programming lab

Aug 2014 - Nov 2014

- Built a chess game with GUI using GTK library. Also, added an AI to the game. Used static board evaluation techniques and implemented Alpha-beta pruning for the AI.

## Courses and labs

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<b>Machine Learning electives:</b>	Machine Learning, Data Mining, Natural Language Processing, Deep Learning, Reinforcement Learning, Kernel methods for pattern analysis, Topics in Deep Learning <sup>1</sup>
<b>Other electives:</b>	Router Architecture and Algorithms, Topics in Design and Analysis of Algorithms
<b>Core courses:</b>	Compiler Design*, Operating Systems*, Computer Networks*, Software Engineering*, Computer System Design*, Discrete Mathematics, Data Structures and Algorithms, Advanced Programming Lab, Database Systems, Paradigms of Programming
<b>Math electives:</b>	Probability and Statistics, Linear Algebra, Graph theory

## Skills and Tools

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- **Libraries** - TensorFlow, Keras, Caffe , Scikit Learn, nltk, numpy, Weka
- **Languages** - C, C++, Java, Python
- **Applications and Tools** - Matlab, Eclipse, Git, SQL

## Achievements & Awards

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- **India Data Science Challenge 2016:** Runners up in India Data Science Challenge organised during India Data Sciences Meet 2016 at Microsoft Hyderabad, India.
- **Microsoft Hackathon 2015:** Part of one of the Top teams in the Institute for building a game Fruit dance in Kinect. Fruit dance was inspired from Fruit Ninja, an Android app.
- Active participant on **Kaggle**. Currently ranked 1333<sup>1</sup> out of over 64k members. Handle - [mohanpb](#)
- Selected for the **ACM ICPC Asia Amritapuri Onsite Regional Contest 2014**, after securing a top 300 team rank.

## Positions of responsibility

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- **Teaching Assistant: Machine Learning:** Designed and evaluated assignments as well as examinations, Conducted talk on "Probability basics".
- Conducted **Online Programming Contest** at Shaastra 2015 with close to thousand participants.
- Mentored 8 freshers in Fall 2015 as a part of **Mitr Student Mentor program**.

<sup>1</sup>subject to vary with time.