

# Akhilesh Gotmare

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MASTER'S STUDENT, COMPUTER SCIENCE, EPFL

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**EDUCATION** **École Polytechnique Fédérale de Lausanne (EPFL)**, Lausanne, Switzerland  
*Master's, Computer Science,* *Sept '16 - present*  
**GPA: 5.26/6 (Overall)**

**Indian Institute of Technology (IIT) Gandhinagar**, Gujarat, India  
*Bachelor of Technology, Electrical Engineering (minor in CSE),* *Jun '12 - Apr '16*  
**GPA: 8.99/10 (Overall)**

**PREPRINTS AND PUBLICATIONS** **Gotmare A.**, Keskar N.S., Xiong C., & Socher R. (2018). A Closer Look at Deep Learning Heuristics: Learning Rate Restarts, Warmup and Distillation. [arxiv:1810.13243](https://arxiv.org/abs/1810.13243)  
(partial results from this work accepted for presentation at *OPTML Workshop, ICML 2018* and *CRACK Workshop, NIPS 2018*)

**Gotmare A.**, Thomas V., Brea J., & Jaggi M. (2018) Decoupling Backpropagation using Constrained Optimization Methods. *Workshop on Efficient Credit Assignment in Deep Learning and Deep Reinforcement Learning, ICML 2018, Stockholm, Sweden* [OpenReview](#)

Langvovoy M., **Gotmare A.**, Jaggi M., & Sra S. (2017). Unsupervised robust nonparametric learning of hidden community properties. pre-print [arxiv:1707.03494v1](https://arxiv.org/abs/1707.03494v1)

**Gotmare A.**, Bhattacharjee S. S., Patidar R., & George N. V. (2017). Swarm and evolutionary computing algorithms for system identification and filter design: A comprehensive review. *Swarm and Evolutionary Computation*, 32, 68-84.

**Gotmare A.**, Patidar R., & George N. V. (2015). Nonlinear system identification using a cuckoo search optimized adaptive Hammerstein model. *Expert systems with applications*, 42(5), 2538-2546.

**EXPERIENCE** **Deep Learning Research Internship**  
*Supervisor(s): Dr. Nitish Keskar, Dr. Caiming Xiong, Dr. Richard Socher*  
*Salesforce Research (Metamind), Palo Alto, US* *Apr '18 - Sept '18*

- Studied mode connectivity and canonical correlational analysis as a tool for neural network loss landscape and activation analysis, partial results published at an ICML 2018 workshop
- Building efficient language modelling architectures using attention only (Transformer decoders - Used representational analysis tools to localize failure of deep nets to adversarial perturbations and guide the design of robust defenses)

**MSc Research Scholarship Program & Semester Project**  
*Supervisor(s): Prof. Martin Jaggi, Dr. Mikhail Langovoy*  
*Machine Learning & Optimization Lab (MLO), EPFL, CH* *Sept '16 - Feb '18*

**Project on Model Parallel and Distributed Backpropagation**

- Studied scalable alternatives to backpropagation for training neural networks
- Implemented and compared algorithms inspired by the alternating direction method of multipliers (ADMM) for neural network training with benchmark techniques like adam, sgd with momentum
- Currently working on ADMM inspired model parallel approaches to deep learning | [Slides](#)

**Project on Robust Learning of Hidden Network Properties**

- Designed and implemented experiments on real and artificial datasets to verify the performance of a novel network scanning algorithm that reveals characteristics of hidden communities
- Contributed to documenting the findings and experimental setup | [Link to Manuscript](#)

## Research Experience for Undergraduates (REU) Internship Program

*Supervisor(s): Prof. Nitesh Chawla*

*Dept. of Computer Science and Engg., University of Notre Dame*

*May '15 - July '15*

- Studied the performance of deep learning techniques for the classification of real world imbalanced datasets for driving applications in healthcare
- Studied data pre-processing techniques like synthetic minority oversampling or SMOTE, undersampling and Tomek-links reduction and their impact on classification performance with neural network models

## Summer Research Internship Program

*Supervisor(s): Prof. Nithin V. George*

*Dept. of Electrical Engineering, IIT Gandhinagar*

*May '14 - July '14*

### **Project on Review of applications of evolutionary optimization to system identification and filter design**

- Performed an exhaustive review of research articles in the areas of system identification and adaptive filter design using evolutionary optimization algorithms
- Compared and documented the strengths, similarities and differences of the various proposed methods, review article published in an international peer-reviewed journal | [Link to Published Article](#)

### **Project on Nonlinear system identification using evolutionary optimizations strategies**

- Developed and implemented a non-linear system identification scheme using Hammerstein models and the Cuckoo Search optimization algorithm | [Link to Published Article](#)
- Obtained superior performance in terms of mean squared error (mse) compared to other genetic algorithms, paper published in an international peer-reviewed journal

## RELEVANT COURSEWORK

### **Undergraduate**

Operating Systems  
Algorithms  
Computational Photography  
Algorithms for Data Science  
Data Management  
Digital Signal Processing

### **Graduate**

Machine Learning  
Advanced Algorithms  
Applied Data Analysis  
Convex Optimization  
Distributed Algorithms  
Mathematics of Data  
Automatic Speech Processing (ongoing)

## COURSE PROJECTS

Recommender system using collaborative filtering techniques	Machine Learning
Analysis of Amazon reviews for Swiss products	Applied Data Analysis
Studying the multiplicative weight updates for solving linear programs	Convex Optimization
Prototype designing of a DBMS for the placement cell at IIT Gandhinagar	Data Management

## TALKS

*Optimization for Deep Learning* at Metamind, Apr 2018 | [Slides](#)  
*ADMM inspired neural network training* at MLO, EPFL, Oct 2017 | [Slides](#)  
*WTA hashing for large scale computer vision applications* at IIT GN, Apr 2016 | [Slides](#)

## ACHIEVEMENTS & AWARDS

**Research Scholarship** by Machine Learning and Optimization Laboratory at EPFL, 2017  
**Academic Excellence Scholarship** (discipline topper), IIT Gandhinagar, 2013  
Cash Prize award for **Journal Publication**, IIT Gandhinagar, 2017 & 2015  
**Dean's List** award for academic excellence in semesters I, II, III, IV, VI and VII of the bachelor's program at IIT Gandhinagar  
High School Scholarship by Maharashtra State, ranked 22/700,000, 2007

## TECHNICAL SKILLS

**Programming:** Python, C, R, Matlab, Shell, LaTeX, SQL  
**Libraries:** sklearn, numpy, scipy, pandas, networkx, opencv, tensorflow, keras  
**Software:** Weka, 8085 Simulator, Autodesk Inventor

## POSITIONS OF RESPONSIBILITY

<b>Academic Secretary</b> , Student Council IIT Gandhinagar	<i>Apr '15 - Apr '16</i>
<b>Primary Licensee and Lead Organizer</b> , TEDxIITGandhinagar	<i>Jan '14 - Aug '14</i>