

Kulin Shah

Research Fellow, Microsoft Research India

t-kusha@microsoft.com ◇ shahkulin98@gmail.com ◇ [Webpage](#) (🏠) ◇ [Github](#) (🐙)

EDUCATION

International Institute of Information Technology, Hyderabad

B. Tech (Honours) in Computer Science and Engineering

August 2015 - July 2019

GPA: 9.01/10

PUBLICATIONS

1. **DEAN: Deep Explainable Abstain Network**
Bhavya Kalra, **Kulin Shah**, Naresh Manwani
Submitted to Conference on Computer Vision and Pattern Recognition (**CVPR**), 2021.
2. **Rawlsian Fair Adaptation of Deep Learning Classifiers** [pdf]
Chiranjib Bhattacharyya*, Amit Deshpande*, Pooja Gupta*, **Kulin Shah*** (* - alphabetical order)
Submitted to International Conference on Artificial Intelligence and Statistics (**AISTATS**), 2021.
3. **Learning and Generalization in Univariate Overparameterized Normalizing Flows** [pdf]
Kulin Shah, Amit Deshpande, Navin Goyal
Submitted to International Conference on Learning Representations (**ICLR**), 2021.
4. **Online Active Learning for Reject Option Classifier** [pdf]
Kulin Shah, Naresh Manwani
AAAI Conference on Artificial Intelligence (**AAAI**), 2020 (**Oral**).
5. **Sparse Reject Option Classifier using Successive Linear Programming** [pdf]
Kulin Shah, Naresh Manwani
AAAI Conference on Artificial Intelligence (**AAAI**), 2019 (**Oral**) .
6. **PLUME: Polyhedral Learning Using Mixture of Experts** [pdf]
Kulin Shah, PS Sastry, Naresh Manwani
7. **Ingredients for Happiness: Modeling Constructs via Semi-supervised Content Driven Inductive Transfer** [pdf]
Bakhtiyar Syed, V. Indurthi, **Kulin Shah**, Manish Gupta and Vasudeva Varma
AAAI-19 Workshop on Affective Content Analysis, AFFCON-19 (**Runner-up** for CL-Aff shared task).

RESEARCH EXPERIENCE

Research Fellow, Microsoft Research, India

Aug 2019 - Current

- Mentor: [Dr. Navin Goyal](#) and [Dr. Amit Deshpande](#)
- Working on problems in generative models, representation learning, theory of deep learning.

Research Intern, Microsoft Research, India

May 2019 - July 2019

- Mentor: [Dr. Amit Deshpande](#) and [Prof. Chiranjib Bhattacharyya](#)
- Worked on problems related to fairness in machine learning.

Research Intern, Indian Institute of Science (IISc), Bangalore

May 2018 - June 2018

- Mentor: [Prof. PS Sastry](#)
- Worked towards understanding architecture and training dynamics of Capsule Network.

Undergraduate Researcher, Machine Learning Lab, IIIT Hyderabad

May 2017 - May 2019

- Mentor: [Dr. Naresh Manwani](#)
- Worked on research problems related to reject option classification, online learning, multi-armed bandit, polyhedral learning, explainability.

SELECTED RESEARCH PROJECTS

- **Learning and Generalization in Univariate Overparameterized Normalizing Flows**
Advisors: [Dr. Navin Goyal](#) and [Dr. Amit Deshpande](#), Microsoft Research India Sep 2019-Present
 - ◊ Normalizing Flow (NF) is a type of generative model. We provided training and generalization proof for univariate Normalizing Flow, modelled using an overparameterized neural network.
 - ◊ We showed that a class of univariate NFs can learn any data distribution and provided evidence that overparameterization can hurt training for another class of NFs (Submitted in **ICLR**, 2021).
- **Online Active Learning for Reject Option Classifier**
Advisor: [Dr. Naresh Manwani](#), IIIT Hyderabad June 2018 - July 2019
 - ◊ Reject Option Classifier (ROC) is a classifier with a rejection, i.e., option of not to classify in one of the class, Usecases: High misclassification cost settings. We proposed two active learning algorithms for ROC.
 - ◊ Provided mistake bound for an algorithm and convergence guarantee for another algorithm. Performed extensive experiments to show the effectiveness of the algorithms (**Oral** presentation at **AAAI**, 2020).
- **Sparse Reject Option Classifier using Successive Linear Programming**
Advisor: [Dr. Naresh Manwani](#), IIIT Hyderabad July 2017 - July 2019
 - ◊ Proposed an algorithm for learning ROC. Analyzed properties of loss function (classification calibration and excess risk bound) and proposed approach (generalization error bounds).
 - ◊ Demonstrated benefits of the proposed approach on several datasets. Showed sparseness of the learned classifier and robustness of the approach against label noise (**Oral** presentation at **AAAI**, 2019).
- **Rawlsian Fair Adaptation of Deep Learning Classifiers** May 2019 - Present
Advisors: [Dr. Amit Deshpande](#), Microsoft Research India and [Prof. Chiranjib Bhattacharyya](#), IISc Bangalore
 - ◊ Using philosopher Rawls' principles of justice, we proposed an objective to obtain an optimal fair classifier. To optimize the objective, underlying data distribution is required.
 - ◊ Proposed an efficient fair adaptation method, which optimizes an approximation of the objective. Showed importance of Rawlsian principles and effectiveness of adaptation technique through several experiments (Submitted in **AISTATS**, 2021).

AWARDS AND ACHIEVEMENTS

- Awarded **Google, Microsoft Research** travel grant and **AAAI Student Scholarship** to attend **AAAI** 2019.
- Awarded **Research Award** for exceptional research work at IIIT Hyderabad.
- Received perfect **10 GPA** in Spring 2018 semester.
- Awarded **Dean's List** award for excellent academic performance in Spring 2016, Spring 2017 and Spring 2018 semesters.
- **34 rank** in India in online round of ACM ICPC programming contest, 2018 (Total 3000+ teams) and **53 rank** in Amritapuri regional of ACM ICPC programming contest, 2017 (Total top 260 teams from India).

POSITIONS

- **Subreviewer** of [IJCAI 2019](#), [IJCNN 2019](#), [ACM IKDD CoDS-COMAD 2019](#) conference.
- **Teaching Assistant** for Statistical Methods in AI (Spring'18), Linear Algebra (Spring'19) and Algorithms (Monsoon'17). Designed & graded assignments, evaluated exams, conducted tutorials and mentored projects.

RELEVANT COURSES

| | | |
|--|-----------------------------|----------------------------|
| Artificial Intelligence | Statistical Methods in AI | Topics in Machine Learning |
| Optimization Methods | Introduction to Game Theory | Linear & Abstract Algebra |
| Probability & Complex numbers | Functional Analysis | Discrete Mathematics |
| Digital Signal Analysis and Applications | Computer Vision | Graphics |