Kulin Shah

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EDUCATION

International Institute of Information Technology, Hyderabad *August 2015 - July 2019*
B. Tech (Honours) in Computer Science and Engineering 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).

WORK 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: Porf. Amit Deshpande and Dr. 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, modeled using an overparameterized neural network.
  - ◇ We showed that a class of univariate NFs can learn any reasonable data distributions 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 option of not to classify in one of the class, Usecases: High misclassification cost settings.
  - ◇ Proposed an active learning algorithm for ROC and analyzed mistake bounds of the algorithm.
  - ◇ Showed a limitation of proposed active learning algorithm and provided a new loss function and an active learning algorithm for ROC to overcome the limitation. Gave convergence guarantee of new active learning algorithm. Extensive experiments to show 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).
  - ◇ Showed benefits of the proposed approach on several datasets. Showed sparseness of the learned classifier and robustness of the proposed 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 Dr. Chiranjib Bhattacharyya, IISc Bangalore
  - ◇ Using philosopher Rawls' principles of justice, we proposed an objective to optimize to obtain an optimal fair classifier. To solve the objective, underlying data distribution is required.
  - ◇ Proposed an efficient fair adaptation method. 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, 2018 (Total 3000+ teams) and **53 rank** in Amritapuri regional of ACM ICPC, 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