Vedant **Nanda**

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Education

Maryland-Max Planck joint program   *MD, USA and Saarbrücken, Germany*

Ph.D. in Computer Science   *2019 - present*

- First year Ph.D. student studying Fairness, Transparency and Interpretability in Machine Learning.

Indraprastha Institute of Information Technology (IIIT) Delhi   *New Delhi, India*

B.Tech. in Computer Science and Engineering   *2015 - 2019*

- **GPA: 9.47/10**, in top 5% of institute
- Part of dean's list for academic excellence for all years

Research Interests

Human-centered ML; Fairness, Accountability and Transparency in Machine Learning.
Broadly, I am interested in building and analyzing machine learning and deep learning systems which are fair, interpretable and explainable.

Publications

On the Long-term Impact of Algorithmic Decision Policies: Effort Unfairness and Feature Segregation through Social Learning   *ICML*

Hoda Heidari *, **Vedant Nanda** *, Krishna P. Gummadi   *2019*

Stop the KillFies! Using Deep Learning Models to Identify Dangerous Selfies   *MSM Workshop, WWW*

Vedant Nanda, H.Lamba, D.Agarwal, M.Arora, N.Sachdeva, P.Kumaraguru   *2018*

Leveraging Facebook's Free Basics Engine for Web Service Deployment in Developing Regions   *ICTD*

S.Singh*, **Vedant Nanda***, R.Sen, S.Sengupta, P.Kumaraguru, K.P.Gummadi   *2017*

Empirical Analysis of Facebook's Free Basics   *SIGMETRICS (poster)*

S.Singh*, **Vedant Nanda***, R.Sen, S.Ahmad, S.Sengupta, A.Phokeer, Z.A.Farooq, T.A.Khan, P.Kumaraguru, I.A.Qazi, D.Choffnes, K.P.Gummadi   *2017*

* Co-first authorship

Internships

Max Planck Institute for Software Systems   *Saarbrücken, Germany*

Research Intern with Prof. Krishna P. Gummadi   *May 2018 - August 2018*

- **Adversarial Machine Learning:** Showed that the activation patterns of hidden layers for adversarial samples visibly differ from the activation patterns of legitimate samples.
- **Data fairness in ML:** Proposed a tweak in the learning process of a decision tree to guarantee data fairness ie: giving optional information would never hurt a candidate in an automated decision making process.
- **Mitigating discrimination in targeted advertisements:** quantified discrimination in the context of targeted advertisements along existing notions of fairness, proposed a presence-only learning algorithm (algorithm which learns only from positively labelled and unlabelled data) to detect discrimination, proposed an algorithm to mitigate discrimination and empirically evaluated the proposed algorithms by running experiments on real world datasets. This work is in collaboration with AT&T research, New York.

Precog Research Group   *New Delhi, India*

Research Intern with Prof. Ponnurangam Kumaraguru ("PK")   *May 2017 - August 2017*

- Built a Facebook chatbot and an android app to collect dangerous selfie locations.
- Collected a total of 2500+ locations across the globe till now.
- Link to chatbot: fb.me/saftiebot; Link to app: goo.gl/2sIdYT

Honors & Awards

2018	Best TA award for Data Structures and Algorithms given by the institute. Core computer science course taught to 300+ freshmen.
2018	Selected for SN Bose scholars program, to spend summer'18 at a US university. Awarded to only 50 undergrad and masters students across India. Deferred in favor of internship at MPI-SWS.
2018	Selected for MPI-SWS internship program.
'16, '17, '18	Dean's List for academic excellence.
'16, '17, '18	Received Chairman Merit scholarship of Rs. 100,000.
2015	Secured the prestigious KVPY scholarship, awarded to brilliant young scientists across India.
2015	Secured an All India Rank of 804 in JEE mains out of 1.5 million candidates.

Research Projects

Actionable Recourse Through Role Models
Independent Project

ADVISOR: PROF. KRISHNA P. GUMMADI
Fall 2018

- PROPOSED AN ALGORITHM TO FIND A "ROLE MODEL" FOR USERS WHO RECEIVED UNDESIRABLE OUTCOME IN AUTOMATED DECISION MAKING SYSTEMS - WITH BLACK-BOX ACCESS TO THE MODEL - SUCH THAT CHANGING USER'S FEATURES TO THAT OF THE ROLE MODEL WOULD RESULT IN FAVORABLE OUTCOME WITH MINIMUM EFFORT.
- RAN EXPERIMENTS TO DEMONSTRATE THE FAIRNESS IN EFFORTS AND LONG TERM IMPACTS OF SUCH EXPLANATIONS FOR MINORITY GROUPS.
- *Outcome:* FULL PAPER PUBLISHED AT ICML 2019.

KillFie: Understanding Dangerous Selfies
Undergrad Thesis

ADVISOR: PROF. PONNURANGAM KUMARAGURU
Fall 2017 - Winter 2018

- GAUGED HOW A USER'S DANGEROUS SELFIE POSTING BEHAVIOR CHANGES BASED ON SOCIAL FEEDBACK. USED PROPENSITY SCORE MATCHING TO ESTABLISH CAUSALITY IN USER BEHAVIOR.
- WORKED ON IDENTIFYING FEATURES OF AN IMAGE THAT RESULT IN ITS CLASSIFICATION AS A DANGEROUS SELFIE USING STATE OF THE ART DEEP LEARNING MODELS.
- BUILT AN ANDROID APP USING THIS MODEL TO NUDGE USERS IF THEY TAKE A DANGEROUS SELFIE.
- *Outcome(s):* 1 PUBLICATION; APP AVAILABLE AT: BIT.LY/SAFTIE-CAM; WORK COVERED BY NPR, BBC WORLD, TIMES OF INDIA AND ECONOMIC TIMES.

Harmony: A Mobile App to Assist Schizophrenia Patients
Independent Project

ADVISOR: PROF. PUSHPENDRA SINGH
Winter 2018

- MADE AN ANDROID APPLICATION TO ASSIST SCHIZOPHRENIC PATIENTS IN ADHERING TO THEIR MEDICINE SCHEDULE.
- WORKED WITH DOCTORS TO UNDERSTAND THE ISSUES EXPERIENCED BY SCHIZOPHRENIC PATIENTS AND ACCORDINGLY DESIGNED AN APP THAT NUDGES USER TO TAKE THE PRESCRIBED MEDICINES.
- *Outcome:* APP BEING USED BY PATIENTS IN AIIMS, INDIA'S LEADING MEDICAL SCHOOL.

An Empirical Analysis of Facebook's FreeBasics
Independent Project

ADVISOR: PROF. RIJUREKHA SEN, PROF. PONNURANGAM KUMARAGURU
Fall 2016 - Winter 2017

- FIRST ONES TO DO A MEASUREMENT BASED STUDY OF FACEBOOK'S FREEBASICS PROGRAM.
- DEPLOYED AND ANALYZED DATA FROM THREE SERVICES: `LEARNBASICS.MPI-SWS.ORG`, `NEWSBUGLE.MPI-SWS.ORG` AND `MYVOICE.MPI-SWS.ORG`. `NEWSBUGLE.MPI-SWS.ORG` AND `MYVOICE.MPI-SWS.ORG` WERE BUILT AND ARE MAINTAINED SOLELY BY ME. `NEWSBUGLE.MPI-SWS.ORG` HAS ATTRACTED 100,000+ UNIQUE USERS.
- *Outcome(s):* 2 PUBLICATIONS; 2 LIVE WEB-SERVICES (`NEWSBUGLE.MPI-SWS.ORG` AND `MYVOICE.MPI-SWS.ORG`) WITH COMBINED 1000+ DAILY ACTIVE USERS.

Selected Coursework

1. **Designing Human Centered Systems**

   WINTER 2018

   MADE AN APP USING IONIC FRAMEWORK FOR PEER TO PEER LEARNING. WORK COVERED IN NATIONAL MEDIA. LEARNED IMPORTANT RESEARCH METHODS SUCH AS HUMAN-CENTERED DESIGN, USER TESTING.

2. **Anthropology of Social Media**

   WINTER 2018

   LEARNED WELL ESTABLISHED CONCEPTS IN SOCIAL SCIENCE LITERATURE SUCH AS STRENGTH OF WEAK TIES, PRESENTATION OF SELF IN EVERYDAY LIFE, ALONE TOGETHER ETC. INTRODUCED TO RESEARCH METHODS LIKE PARTICIPANT OBSERVATION.

3. **Information Retrieval**

   WINTER 2018

   IMPLEMENTED AN IR SYSTEM TO FILTER OUT ACTIONABLE USER-REVIEWS FROM A LARGE CORPUS OF REVIEWS. USED ASSOCIATION RULE MINING AND FUZZY CLUSTERING.

4. **Collaborative Filtering**

   FALL 2017

Proposed a new deep neural network based technique to predict user rating by calculating user's features using node2vec on a user's social graph. Code: `https://github.com/nvedant07/cf_project`.

5. **Machine Learning**

Fall 2017

Built deep convolutional autoencoder to learn a model which automatically transfers color to NIR images.

6. **Network Administration**

Winter 2017

Emulated a Tor network using personal machines by setting up an authority server, a client and 2 relays. Code can be found here.

7. **Advanced Programming**

Fall 2016

Built a search engine for the DBLP dataset. Code: github.com/nvedant07/dblp.

8. **System Administration**

Fall 2016

Setup a postgreSQL database cluster and configured it for load balancing and high availability. Connected it to a GUI based web application for testing. Code can be found here.

Skills

Advanced	Python, Numpy, Pytorch, Pandas, Django, Java, Android Studio, C/C++, Git
Medium	Matplotlib, Keras, Tensorflow, HTML, CSS, LaTeX, SQL, NoSQL
Basic	R, JavaScript, jQuery, Ionic Framework, MATLAB/Octave, SVN

References

1. **Dr. Krishna P. Gummadi**

Scientific Director

MPI-SWS

2. **Dr. Ponnurangam Kumaraguru ("PK")**

Associate Professor

IIIT Delhi