AYAN MAJUMDAR
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Education

- **Saarland University** — Saarbrücken, Germany
  M.Sc. in Informatics — October 2017 - Ongoing
  - **GPA (till now):** 1.3/1.0 (German scale)
- **Heritage Institute of Technology** — Kolkata, India
  B.Tech. in Electronics and Communication Engineering — 2011 - 2015
  - **GPA:** 8.8/10

Research Experience

- **Generating counterfactuals for causal fairness** — Saarbrücken, Germany
  Master's thesis: Max Planck Institute for Software Systems — Jan. 2020 - Ongoing
  - Explored deep generative models and their implicit assumptions in generating counterfactuals from observed data.
  - **Supervisors:** Prof. Krishna Gummadi, Prof. Isabel Valera
- **Exploring bias in generative models** — Saarbrücken, Germany
  Student researcher: Max Planck Institute for Software Systems — Apr. 2019 - Dec. 2020
  - Worked on estimating, quantifying and mitigating bias in generative models. Explored applications of these models to achieve robustness.
  - **Supervisor:** Prof. Krishna Gummadi
- **Community-based routing in delay tolerant networks** — Shibpur, India
  Research assistant: Indian Institute of Engineering Science and Technology — 2015
  - Studied novel community-based routing algorithm using social metrics for delay-tolerant networks in post-disaster scenarios.
  - **Supervisor:** Prof. Tamaghna Acharya

Work Experience

- **Graduate Assistant** — Apr. 2018 - Mar. 2019
  SFB1102, Saarland University — Saarbrücken, Germany
  - **Mutual Intelligibility in Slavic Languages:** Performed automated data collection and multi-sentence alignment for multilingual NLP experiments. Developed the web-based linguistic experiment to assist in user studies.
    Supervisor: Prof. Dietrich Klakow
- **Systems Engineer** — Jul. 2015 - Aug. 2018
  Infosys Ltd. — Bengaluru, India
  - **Engineering Services Communication Products:** Worked on using SIP (Session Initiation Protocol) and voice over IP (VoIP) for the development of Session Border Controller (SBC) for a reputed US client.

Teaching Experience

- **Graduate Teaching Assistant** Mar. 2019
  Saarland University Saarbrücken, Germany
  - Statistical Natural Language Processing

Relevant Coursework

- **Graduate Level** Oct. 2017 - Ongoing
  Saarland University Saarbrücken
  - Artificial Intelligence, Information Retrieval and Data Mining, Machine Learning, Statistical Natural Language Processing, Neural Networks: Implementation and Application, High-level Computer Vision, Methods of Mathematical Analysis, Statistics with R, Human-centered Machine Learning, Machine Learning in Cybersecurity, Information Extraction, Seminar: Machine Learning
- **Undergraduate Level** Jul. 2011 - May 2015
  Heritage Institute of Technology Kolkata, India
  - Signals and Systems, Digital Electronic and Integrated Circuits, Microprocessor and Microcontrollers, Data Structures and C, Digital Signal Processing, Information Theory and Coding, Object Oriented Programming, Embedded Systems, Database Management Systems

Other Projects

- **Temporal point process and smart broadcasting**
  - Implemented sampling and fitting of Hawkes process using Ogata's thinning algorithm. Tackled problem of optimal broadcasting using Hawkes, RedQueen. Code can be found here.
- **Predicting the Vulnerability of Windows Machines to Malware**
  - Based on the Kaggle Competition, applied various machine learning methods to predict the vulnerability of Windows PCs to malware. Code can be found here.
- **Debiasing Word Embeddings**
  - Explored Bolukbasi et.al. 2016 to detect bias direction in word-embeddings and neutralize the bias using projection. Code can be found here.
- **Neural Machine Translation**
  - Mini-project on solving the task of machine translation using bi-directional LSTM and attention mechanism. Code can be found here.
- **Exploring Personalized Image Captioning**
  - Explored and extended Attend2You to generate personalized image captions. Detailed report can be found here.
- **Word2Mat: A New Type of Word Representation**
  - Extend word2vec to encode words as matrices for improved contextual sense. Code and report can be found here. **Supervisor:** Prof. Dietrich Klakow.
- **Evasion Attack and Defence of CNN Model for Image Classification**
  - Implemented adversarial examples using different attacks. Explored how adversarial training can act as a defence against these. Implemented gradient based attack from scratch using Keras. Code can be found here.

- **Building a Neural Network from scratch using NumPy**
  - Built simple neural network with forward and backward propagation functionalities from scratch using only Numpy. Also tested different regularization methods.
- **Automated traffic detection and control using image processing**
  - B.Tech. final degree project on applying image processing methods to automatically detect vehicles from dynamic traffic video streams. **Supervisor:** Prof. Anindya Sen.

Talks / Posters

- **Cornell, Maryland, Max Planck Pre-doctoral Research School** 2020
  Poster: Counterfactual data generation using VAE Saarbrücken, Germany

Other Academic Activities

- Attended Microsoft Research conference **Frontiers in Machine Learning**, 2020.
- Attended **International Conference of Machine Learning**, 2020.

Online Certifications

- **Algorithms**: Algorithmic toolbox, Data structures, Algorithms on Graphs, Algorithms on Strings – *Coursera*
- **Machine Learning**: Machine Learning Foundations, Machine Learning: Regression, Deep Learning: Sequence Models – *Coursera*

Skills

- **Programming:**
  Languages: *Python, R, Java, C, C++, MATLAB*
  Database Coding: *SQL*
  Others: *HTML, CSS, Shell Scripting*
- **Libraries, packages and frameworks:**
  Machine learning: *NumPy, Scikit-Learn, Pandas, SciPy*
  Deep learning: *PyTorch, Keras, Tensorflow*
  Visualization: *Matplotlib, Seaborn, ggplot*
  Adversarial ML: *CleverHans, Foolbox*
  NLP: *NLTK, Spacy*
  Image processing: *Torchvision, Pillow*
  Web: *Django, Angular*
  Others: *LaTex, Stan*
- **Operating Systems:** *Ubuntu, MacOS, Windows*
- **Version control:** *Git, Clearcase*

Awards

- Spot Award for December 2016 and given Certificate of Appreciation for contribution to project at Infosys.
- Infy Insta award for Q3 2016-17 for commendable performance in project.