

Utkarsh Patel

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EDUCATION

INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

Kharagpur, India | 2018 - 2023

BACHELOR AND MASTER OF TECHNOLOGY (DUAL DEGREE) | GPA 9.47/10

Major: Electronics and Electrical Communication Engineering; **Minor:** Computer Science and Engineering

Coursework: Algorithms, Machine Learning, Programming and Data Structures, Probability and Stochastic Processes

ACHIEVEMENTS

- **Department Rank 1** among the Dual Degree students of Electronics and Electrical Communication Engg. Dept.
- **Global Rank 70** among 12,000+ contestants in **Google Kick Start 2021** (Round C)
- Secured **department change** to E&ECE by acquiring **9.69** CGPA at the end of the first year

EXPERIENCE

COMPLEX NETWORKS RESEARCH GROUP | UNDERGRAD RESEARCHER IIT Kharagpur | Feb 2021 - Present

- Working on **Hate-Speech** detection in debate portals using Transformer NNs like **BERT** in adversarial setting
- Achieved **5.1%** absolute improvement in macro-F1 score by fine-tuning BERT on **CMV** dataset against baselines
- Implemented semi-supervised **GAN** based BERT and compared its performance with the classical BERT
- Projected attention weights to the original texts as heat maps to identify the keywords triggering hate
- Created a corpus of 10,000+ politics-related posts containing 114,000+ comments using **Beautiful Soup**
- Used **NetworkX** to build support and dispute networks of 7,000+ users to identify key users and communities

BRAIN-COMPUTER INTERFACE LAB | UNDERGRAD RESEARCHER IIT Kharagpur | Aug 2020 - Dec 2020

- Worked on the **ABIDE** dataset to extract and process resting-state functional MRI data using **nilearn**
- Used correlation-based approach to determine functional connectivity between regions of interest
- Implemented various classification algorithms to classify subjects as autistic or not from the connectivity matrices
- Achieved test accuracy of **0.68** and **0.65** using **Support Vector Machines** and **K-Nearest Neighbors** respectively

SKILLS

C++ | Python | Git | Beautiful Soup | NetworkX | PyTorch | TensorFlow | Keras | Scikit-learn | NumPy | Pandas | \LaTeX

PROJECTS

CREATEDEBATE SCRAPER

PYTHON, BEAUTIFUL SOUP, NETWORKX

- Developed a web crawler to scrape all the debates from CreateDebate.com using **Beautiful Soup**
- Used **NetworkX** to construct graphs representing the nested hierarchical structure of the comments in the threads
- Incorporated features like sort-by, type, topic, time and state of the debate to narrow down the search space

TARGETED ASPECT-BASED SENTIMENT ANALYSIS

PYTHON, TRANSFORMER NNs, NLP

- Transformed the task into Sentence-pair classification by constructing auxiliary sentences from target-aspect pairs
- Used Question Answering and Natural Language Inference methodologies for constructing auxiliary sentences
- Fine-tuned **BERT** on **SentiHood** dataset, achieved aspect F1-score **0.90** and sentiment AUC **0.98**

MACHINE LEARNING COURSE PROJECT

PYTHON, SCIKIT-LEARN, NUMPY, PANDAS

- Implemented **Regression Trees** to predict the increase in Covid-19 cases, used **RE-pruning** to prevent over-fitting
- Implemented **Naive Bayes** classifier to predict patient length-of-stay in ICUs, used **PCA** for dimension reduction
- Used **SVM** and **MLP** classifier to predict the biodegradability of chemical from its molecular description