

Siddhant Agarwal

Delhi, India — siddhant20247@iiitd.ac.in — +91 9711888893 — linkedin.com/in/siddhant-ag

RESEARCH INTERESTS

NLP for Social Good and Computational Social Science - specifically, building AI solutions for problems on online social media platforms such as those around Hate Speech and Fake News.

Language + Vision - developing techniques for efficient and effective language grounding with vision to help solve increasingly common and challenging multimodal problems

EDUCATION

IIIT Delhi, India December, 2020 — May, 2024

B.Tech. in Computer Science and Artificial Intelligence

Grade: 9.41/10.00 CGPA

- Currently ~ top 2% of my class
- Received a branch transfer from ECE to CS with AI in my first semester by being in the top 10% of my class

Indraprastha International School, Delhi

2019 — 2020

CBSE — Grade XII (Science)

Grade: 95%

- Qualified JEE Advanced Examination 2020 with a rank of **10314** (School Rank: 2)
- Qualified JEE Main Examination 2020 with a **97.6** Percentile (School Rank: 3)

Indraprastha International School, Delhi

2017 — 2018

CBSE — Grade X

Grade: 96%

100% marks in Mathematics

(School Rank: 3)

PUBLICATIONS

What Do You MEME? Generating Explanations for Visual Semantic Role Labelling in Memes

Shivam Sharma, **Siddhant Agarwal**, Tharun Suresh, Preslav Nakov, Md. Shad Akhtar, Tanmoy Chakraborty

AAAI 2023 (CORE A)*

Selected for Oral Presentation

MemeMQA: Multimodal Question Answering for Memes via Rationale-Based Inferencing

Siddhant Agarwal, Shivam Sharma, Preslav Nakov, Tanmoy Chakraborty

Under Review

EXPERIENCE

Laboratory for Computational Social Systems, IIIT Delhi

Delhi, India

Undergraduate Researcher

May, 2022 - Present

Guides: Md. Shad Akhtar (IIIT Delhi), Tanmoy Chakraborty (IIT Delhi)

Research Areas: Natural Language Processing, Multimodal Analysis, Social Media Analysis

- Involved in projects related to multiple research questions centered around understanding the diffusion of harm on online social media platforms through memes.
- Worked on a project involving generation of natural language explanations for harmful references by entities in a meme. This work was accepted to AAAI 2023 as a full conference paper and is available here.
- Lead a project aimed at formulating problems in meme analysis in a semi-open ended question answering setup. This work is currently under review at a CORE A* conference.
- Currently working on a project which aims at identifying depressive symptoms from a dataset of depressive memes collected from online social media platforms.

Summer Institute in Computational Social Science, IIIT Hyderabad

Telangana, India

Student Participant

July 2022

Guide: Ponnurangam Kumaraguru (IIIT Hyderabad)

Research Areas: Computational Social Science, Social Media Analysis

- Attended the SICSS summer school program at IIIT Hyderabad getting exposure to various CSS domains and collaborating with people across multiple domains of Computer Science and Social Science
- Worked on a project involving analysis of the level of engagements of various government agencies on social media websites such as Twitter using data extracted from the Twitter API

Sarthak Educational Trust (NGO)

Delhi, India

Teaching Volunteer

May, 2023 – July, 2023

- Volunteered for 80 hours with the NGO to provide computer lectures to differently-abled students.
- Conducted online tutorials for students suffering from motor disabilities to get them acquainted with computer basics and technologies such as Microsoft Office, Google Chrome, Gmail.
- Provided assistance to students who were new to using such computer devices.

PROJECTS

Explanations for Harmful Memes

Research Project

Project Link: <https://github.com/LCS2-IIITD/LUMEN-Explaining-Memes>

May, 2022 - August, 2022

Guides: Tanmoy Chakraborty (IIT Delhi), Md. Shad Akhtar (IIIT Delhi), Preslav Nakov (MBZUAI Abu Dhabi)

Research Areas: Natural Language Processing, Multimodal Analysis

- Co-Authored the research paper — **What do you MEME? Generating Explanations for Visual Semantic Role Labelling in Memes** accepted at **AAAI 2023** — Available at: <https://doi.org/10.1609/aaai.v37i8.26166>.
- The goal of the project was to analyse hate speech spread via memes and generate natural language explanations for harmful and hateful memes in two domains - Covid19 and US Politics.
- Contributions include annotating a set of about 7000 memes with natural language explanation for the NLG task
- Developed several unimodal as well as multimodal baseline models for the task of natural language explanation generation, gaining experience of working with transformer encoder-decoder models such as BERT, GPT2, T5 using the HuggingFace library.
- Proposed a novel multimodal model, LUMEN, for the multi-task setup involving role label prediction and natural language explanation generation

Multimodal Question Answering for Harmful Memes using Rationales

Research Project

Guides: Tanmoy Chakraborty (IIT Delhi), Preslav Nakov (MBZUAI Abu Dhabi)

September, 2023 - July, 2023

Research Areas: Natural Language Processing, Multimodal Analysis

- Goal of the project is to propose a semi-open ended Question Answering task formulation for Harmful Memes to answer questions such as identification of harmful targets of a meme and a corresponding explanation from the multi-modal data of memes.
- Modelled transformer based models for the task of Multimodal Question Answering in memes and adapting SOTA models from GitHub for our task for comparison.
- Lead the development of a novel multimodal multi-step strategy involving the utilisation of LLM generated rationales for performance improvements on the proposed task.
- This work is currently under review at a CORE A* conference as my maiden first-author contribution.

Depressive Symptom Analysis in Memes

Research Project

Guides: Md. Shad Akhtar (IIIT Delhi), Shweta Yadav (University of Illinois Chicago)

August, 2023 - Present

Research Areas: Natural Language Processing, Multimodal Analysis, Mental Health

- The goal of this project is to expand on previous work on depressive memes by formulating novel multimodal models for the task of depressive symptom classification in memes.
- Worked extensively on cleaning data presented previously in the RESTORE dataset which is a collection of over 9,000 memes on depression and depressive symptoms.

- Investigating the utility of recent Large Language Models and Vision Language Models in the classification task by utilising their ability to understand and correlate intended meanings of the meme-author.

Investigating Image Captioning with Stable Diffusion

Course Project
January, 2023 - May, 2023

Project Link: <https://shorturl.at/bmAKR>

Guide: Md. Shad Akhtar (IIIT Delhi)

Tech Stack: HuggingFace, PyTorch, Stable Diffusion

- Worked on a multi-modal setup to generate natural language captions for images in the Flickr8k dataset.
- Compared our proposed model against various SOTA baselines such as GIT and BLIP implemented using the HuggingFace library.
- Added a novel strategy of using AI generate images and the corresponding captions for synthetic data creating using the state of the art Stable Diffusion Model.
- Performed rigorous error analysis identifying edge cases in the caption generation setup.

Projecting 3D objects in 2D via Augmented Reality and Hand Gestures

Course Project
January, 2023 - May, 2023

Project Presentation: <https://shorturl.at/tBM19>

Guide: Saket Anand (IIIT Delhi)

Tech Stack: OpenCV, Numpy

- Developed an augmented reality system to visualise 3D objects in 2D and manipulate them via hand gestures.
- Made use of Aruco markers for detecting the plane in the world frame, calculating the homography of the plane and calculating the world to camera frame transformation matrix through the image formation pipeline
- Project the 3D object over the detected plane using CV2. Used hand landmark detection to detect hand gestures and perform manipulations such as zoom and rotate by manipulating the rotation matrix during projection

Claim Detection on Twitter

Course Project
January, 2023 - May, 2023

Project Link: <https://github.com/siddhant-iiitd/Claim-Detection-on-Twitter>

Guide: Md. Shad Akhtar (IIIT Delhi)

Tech Stack: Transformers, Pytorch, scikit-learn

- Conducted an extensive literature survey on the active NLP research task of Claim Detection.
- Performed experiments for claim detection classification task using several classical ML techniques as well as Language Models such as BERT.
- Proposed a model with important preprocessing steps and classification using BERT embeddings which improves on SOTA baselines
- Presented our work as a research paper in the ACL format with extensive error analysis

Brain Stroke Detection on Imbalanced Data

Course Project
January, 2023 - May, 2023

Project Link: https://github.com/siddhant-iiitd/Brain_Stroke_Detection_ML_Project

Guide: Jainendra Shukla (IIIT Delhi)

Tech Stack: scikit-learn, Matplotlib, Pandas, Numpy

- Developed algorithms for the prediction of Brain Strokes using several ML techniques such as Random Forests, Logistic Regression, Multilayer Perceptron and Support Vector Machines as part of the final project for ML course.
- Performed extensive data analysis and pre-processing for handling the complication of data imbalance.
- Reported our results with detailed error analysis in the form of a research paper in CVPR format.

SKILLS

- **Relevant Coursework:** Natural Language Processing[†], Deep Learning[†], Machine Learning, Statistical Machine Learning, Linear Algebra, Probability and Statistics, Computer Vision, Reinforcement Learning[†], Artificial Intelligence[†], Robotics[†], Ethics in AI, Convex Optimisation, Social Networks^δ, Generative Adversarial Networks^δ, Machine Learning Engineering for Production^δ.
- **Programming:** Python, Java, SQL, MATLAB, HTML/CSS, JavaScript, Prolog.
- **Tools and Technologies:** Huggingface, PyTorch, TensorFlow, NLTK, OpenCV, scikit-learn, Git, Linux, Flask.
- **Communication:** Debating, Public Speaking, Creative Writing, Active Listening.

([†]Graduate Level Course, ^δMOOC)

AWARDS AND ACHIEVEMENTS

- **Dean's List of Academic Excellence Award** on IIIT Delhi Foundation Day for excellent academic performance.
- **CBSE Merit Certificate in Mathematics** for being among the top 0.1 per cent of successful candidates in Mathematics exam with 100/100 score in CBSE Board Examinations 2018.
- **Super Scholar Award (2019)** for consistent excellent academic performance and receiving the Scholar award for 7 continuous years.

CO-CURRICULAR ACTIVITIES

- **Mentor at Undergraduate Research Club, IIIT Delhi:** I am a student mentor at the newly established URC where I share my experience and mentor junior undergraduates on how to get involved with research activities at research labs across the campus
- **Student Volunteer at ICON 2022 Conference:** Volunteered throughout the three days of the premier Indian NLP conference with responsibilities ranging from managing smooth conduct of sessions, managing registrations and attending to invited guests.
- **Model UN:** Interested in debate and participated in over 10 Model UN conferences with multiple awards