Subhabrata Dutta

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NLP researcher with broad interest in Machine Learning in general. Currently, working as a Senior Research Associate at Laboratory for Computational Social Systems, IIT Delhi, mentored by Dr. Tanmoy Chakraborty and Prof. Soumen Chakrabarti. Current research interest revolves around Large Language Models; precisely focused on reasoning, prompt engineering, and interpretation. Additionally, shares interest in Temporal Graph Representation Learning. Submitted doctoral thesis, titled *Engagement to Persuasion: A Computational Study on Online Social Discourse*, in 2023. Doctoral research is centered around the qualitative and quantitative analysis of online social platforms.

Education

- Ph.D.   2023
  Department of Computer Science and Engineering, Jadavpur University
- M.E. (Computer Science)   2016
  Department of Computer Science and Engineering, Jadavpur University
- B.E. (Computer Science)   2014
  Department of Computer Science and Engineering, Jadavpur University

Research Experience

- Senior Research Associate   2022-
  IIT Delhi

Project title: "*Separating the what from the how in Pretrained Language Models: A step towards generic AI*"
Funded by: Defence Research and Development Organisation (DRDO), Ministry of Defense, Govt. of India.
Primarily exploring the reasoning and memorization abilities of LLMs; developed 1) framework for RL-based tool-augmented learning of LLMs towards mathematical reasoning, 2) framework for multihop reasoning via separation of solver and generalizable decomposer modules. Currently working on mechanistic interpretability of LLM reasoning.

Project title: "*Exploring the roles of Network Topology, Temporal Online Interactions, and Downstream Tasks in Graph Representation*"
Funded by: Meta Inc.
Working on graph representation learning towards four major challenges: curvature-aware

rewiring to solve oversquashing and oversmoothing, inductive link prediction on temporal interaction networks, and, incremental learning on large dynamic graphs.

Project title: "*Mixed context learning with LLMs under Low-resource setting*"
Funded by: Adobe Research, India
Exploring the limits of in-context learning using LLMs with heterogeneous context-target pairing across languages, tasks, and modalities.

- Junior Research Fellow   2021-2022
    Jadavpur University

Project title: "*Claim Detection and Verification using Deep NLP: an Indian Perspective*"
Funded by: Defence Research and Development Organisation (DRDO), Ministry of Defense, Govt. of India.
Developed datasets for identification of factual claims in multilingual tweets.

- Junior Research Fellow   2018 – 2021
    Jadavpur University

West Bengal State Government Fellow
Conducted doctoral research on engagement mining on online social platforms.

Teaching Experience

- Module titled 'C programming and data structure'   2018 – 2019
    Jadavpur University, India
- Module titled 'C programming and data structure'   2017 – 2018
    Jadavpur University, India
- Module titled 'Computer Graphics'   2017 – 2018
    Jadavpur University, India
- Module titled 'Advanced data structures and algorithms'   2017 – 2018
    RCCIIT, India
- Module titled 'Natural language processing'   2017 – 2018
    Aliah University, Kolkata

Technical Skills

- **Programming & Scripting:** Python, C
- **Programming Libraries:** PyTorch, Tensorflow

Achievements

- Outstanding paper award ACL, 2023
- Secured All India Ranking 16 GATE (2014), Computer science and engineering
- Rank holder, Madhyamik Pariksha (2007), West Bengal Board of Secondary Education

Publications

1. Frugal LMs Trained to Invoke Symbolic Solvers Achieve Parameter-Efficient Arithmetic Reasoning
   S Dutta*, J Singh*, I Pandey*, S Manchanda, S Chakrabarti, T Chakraborty
   To appear in AAAI 2024
2. Small Language Models Fine-tuned to Coordinate Larger Language Models improve Complex Reasoning
   G Juneja*, S Dutta*, S Chakrabarti, S Manchanda, T Chakraborty
   EMNLP 2023
3. Thus Spake ChatGPT: On the reliability of AI-based chatbots for science communication
   S Dutta, T Chakraborty
   CACM Opinion 2023
4. Multilingual LLMs are Better Cross-lingual In-context Learners with Alignment
   E Tanwar*, S Dutta*, M Borthakur, T Chakraborty
   ACL 2023 (selected as **Outstanding paper**)
5. Hatemongers ride on echo chambers to escalate hate speech diffusion
   V Goel*, D Sahnan*, S Dutta*, A Bandhakavi, T Chakraborty
   PNAS nexus 2023
6. Incomplete gamma integrals for deep cascade prediction using content, network, and exogenous signals
   S Dutta, S Mittal, D Das, S Chakrabarti, T Chakraborty
   IEEE TKDE 2022
7. Can Unsupervised Knowledge Transfer from Social Discussions Help Argument Mining?
   S Dutta*, J Juneja*, D Das, T Chakraborty
   ACL 2022
8. Semi-supervised stance detection of tweets via distant network supervision
   S Dutta, S Caur, S Chakrabarti, T Chakraborty
   WSDM 2022
9. Redesigning the transformer architecture with insights from multi-particle dynamical systems
   S Dutta, T Gautam, S Chakrabarti, T Chakraborty
   NeurIPS 2021 (selected as **Spotlight**)
10. Hate is the new infodemic: A topic-aware modeling of hate speech diffusion on twitter
    S Masud*, S Dutta*, S Makkar, C Jain, V Goyal, A Das, T Chakraborty
    ICDE 2021

11. Deep exogenous and endogenous influence combination for social chatter intensity prediction
    S Dutta, S Masud, S Chakrabarti, T Chakraborty
    KDD 2020
12. Changing views: Persuasion modeling and argument extraction from online discussions
    S Dutta, D Das, T Chakraborty
    Information Processing & Management 2020
13. Modeling engagement dynamics of online discussions using relativistic gravitational theory
    S Dutta, D Das, T Chakraborty
    ICDM 2019
14. Into the Battlefield: Quantifying and modeling intra-community conflicts in online discussion
    S Dutta, D Das, G Kaur, S Mongia, A Mukherjee, T Chakraborty
    CIKM 2019

[*] Equal contribution as first author

References

Dr. Tanmoy Chakraborty   Associate Professor, IIT Delhi   tanchak@ee.iitd.ac.in

Prof. Soumen Chakrabarti   Professor, IIT Bombay   soumen@cse.iitb.ac.in