

Suman Adhya

PhD Scholar at SMCS in IACS

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Vision Statement

My doctoral research advanced the **robustness**, **interpretability**, and **efficiency** of neural topic models by improving **representation learning**, preventing posterior collapse, and applying **knowledge distillation**. Building on this foundation, my current agenda targets two fronts for LLMs: **mechanistic interpretability**—uncovering how internal computations yield behavior—and **algorithmic scaling**—making large models more tractable and sustainable. My ultimate goal is to leverage my skills in representation learning and algorithmic design to help build LLMs that are **auditable**, **trustworthy**, and **resource-efficient**.

Short Bio







I am a Ph.D. candidate at the School of Mathematical & Computational Sciences (SMCS) in IACS, with a specialization in topic modeling for NLP. My research focuses on enhancing the quality of topic representations, improving interpretability, and increasing the efficiency of topic models, with publications in venues such as ACL 2025, NAACL 2024, EACL 2023, ECIR 2023, and IEEE Transactions on Artificial Intelligence. I will submit my doctoral thesis for review in August 2025 and am actively seeking a full-time research position in either industry or academia.

Education

Ongoing Oct 2025	Indian Association for the Cultivation of Science Ph.D. from the School of Mathematical & Computational Sciences (SMCS)	Kolkata, India
Jul 2020 Aug 2018	Indian Association for the Cultivation of Science M.Sc. in Mathematics & Computing from SMCS	Kolkata, India
2018 2015	Serampore College, University of Calcutta B.Sc.(Hons.) in Mathematics	Kolkata, India

Research Contributions & Artifacts

- DTECT: Dynamic Topic Explorer & Context Tracker** 2025
- > An **end-to-end interactive system** for exploring and interpreting the **evolution of topics in temporal corpora**, integrating **modeling, evaluation, visualization**, and **LLM-assisted insights**.
 - > **Artifacts:** [GitHub Codebase](#) | [Hugging Face Demo](#) | [Video Walkthrough](#)
- S2WTM** 2025
- > A novel topic model, the **Spherical Sliced-Wasserstein Autoencoder**, that mitigates **posterior collapse** on **hyper-spherical manifolds** to generate more coherent and diverse topics. Presented at **ACL 2025**.
 - > **Artifacts:** [GitHub Codebase](#)
- GINopic** 2024
- > A topic modeling framework that leverages **Graph Isomorphism Networks (GIN)** to capture the **mutual dependencies between words**, an aspect often missed by contextualized models. Presented at **NAACL 2024**.
 - > **Artifacts:** [GitHub Codebase](#)
- CTM-KD** 2023
- > A **knowledge distillation** framework to **compress** large topic models by minimizing both cross-entropy and the **2-Wasserstein distance** between latent distributions. Our student model surpasses the teacher in topic coherence with far fewer parameters. Presented at **ECIR 2023**.
 - > **Artifacts:** [GitHub Codebase](#)
- CTM-Neg** 2022
- > An enhancement for contextualized topic models that introduces a **negative sampling** mechanism using a **triplet loss** on perturbed document-topic vectors. This approach significantly improves both **topic coherence** and **diversity**. Presented at **ICON 2022**.
 - > **Artifacts:** [GitHub Codebase](#)

- [P] **DTECT: Dynamic Topic Explorer & Context Tracker** 
Suman Adhya and Debarshi Kumar Sanyal
[Code](#) / [Demo](#) / [Video](#) [arXiv]
- [C] **S2WTM: Spherical Sliced-Wasserstein Autoencoder for Topic Modeling** 
Suman Adhya and Debarshi Kumar Sanyal
Association for Computational Linguistics, Vienna, Austria [ACL'25]
- [J] **Evaluating Negative Sampling Approaches for Neural Topic Models** 
Suman Adhya, Avishek Lahiri, Debarshi Kumar Sanyal, and Partha Pratim Das
IEEE Transactions on Artificial Intelligence
An extension of work initiated under the guidance of Prof. Partha Pratim Das (Ashoka University). [IEEE-TAI]
- [C] **GINopic: Topic Modeling with Graph Isomorphism Network** 
Suman Adhya and Debarshi Kumar Sanyal
North American Chapter of the Association for Computational Linguistics, Mexico City, Mexico [NAACL'24]
- [C] **Do Neural Topic Models Really Need Dropout? Analysis of the Effect of Dropout in Topic Modeling** 
Suman Adhya, Avishek Lahiri, and Debarshi Kumar Sanyal
17th European Chapter of the Association for Computational Linguistics, Dubrovnik, Croatia [EACL'23]
- [C] **Improving Neural Topic Models with Wasserstein Knowledge Distillation** 
Suman Adhya and Debarshi Kumar Sanyal
45th European Conference on Information Retrieval, Dublin, Ireland [ECIR'23]
- [C] **Improving Contextualized Topic Models with Negative Sampling** 
Suman Adhya, Avishek Lahiri, Debarshi Kumar Sanyal, and Partha Pratim Das
19th International Conference on Natural Language Processing, New Delhi, India
This work was initiated under the foundational guidance of Prof. Partha Pratim Das (IIT Kharagpur). [ICON'22]
- [W] **What Does the Indian Parliament Discuss? An Exploratory Analysis of the Question Hour in the Lok Sabha** 
Suman Adhya and Debarshi Kumar Sanyal
1st Workshop on Natural Language Processing for Political Sciences, LREC, Marseille, France [PoliticalNLP @ LREC'22]


Skills


Programming Languages	Python (Proficient), C, R (Familiar)
Tools & Frameworks	PyTorch, TensorFlow, HuggingFace, LangChain, Scikit-learn, Pandas, Scipy, Gensim, Sentence-Transformers, PyTorch Geometric (PyG), FAISS, Streamlit
Algorithms & Methods	Topic Modeling, Representation Learning, Knowledge Distillation, Negative Sampling, Optimal Transport, Graph Neural Networks (GNNs)

Presentations


- > ACL 2025, Poster Presentation  July 2025 (Vienna, Austria)
- > PIC 2025, Lighting Talk and Poster Presentation  Feb 2025 (Mysore, India)
- > NAACL 2024, Poster Presentation  June 2024 (Virtual)
- > PIC 2024, Poster Presentation  Feb 2024 (Mysore, India)
- > EACL 2023, Poster Presentation  May 2023 (Dubrovnik, Croatia)
- > ECIR 2023, Short Paper Presentation  March 2023 (Virtual)
- > ICON 2022, Full Paper Presentation  December 2022 (IIIT-Delhi, India)
- > PoliticalNLP @ LREC 2022, Poster Presentation  June 2022 (Virtual)


Travel Grants and Awards


ACM India-IARCS Travel Grant, 2025  : Awarded for presenting our paper at ACL'25 held in Vienna, Austria.


ANRF-International Travel Support, 2025  : Awarded for presenting our paper at ACL'25 held in Vienna, Austria.

ACM India Research Facilitation Grant, 2025  : Awarded to cover the extra page charges of our paper at IEEE-TAI.

Microsoft Research Travel Grant, 2024  : Awarded for presenting our paper at NAACL'24 held in Mexico City, Mexico.

ACM India-IARCS Travel Grant, 2024  : Awarded for presenting our paper at NAACL'24 held in Mexico City, Mexico.

Microsoft Research Travel Grant, 2023  : Awarded for presenting our paper at EACL'23 held in Dubrovnik, Croatia.

Travel Grant for EACL, 2023  : Awarded for presenting our paper at EACL'23 held in Dubrovnik, Croatia.

The INSPIRE-SHE Award, DST, 2015-2018  : Awarded for securing a top 1% rank in Class 12th examinations.

Teaching Assistant

Introduction to Machine Learning [PHD 226/ COM 4203], IACS

January - June, 2024

- > Assisted a graduate-level course with approximately **20 students**.
- > **Responsibilities:** Designed and graded all programming assignments, and conducted dedicated doubt-clearing sessions to resolve student queries.
- > **Topics Covered:** Assignments spanned key ML concepts, including Linear Regression, Decision Trees, SVM, k-NN, the EM Algorithm, and Neural Networks.








Laboratory - Numerical Methods (PHS 4211), IACS




January - June, 2021

- > Managed lab sessions for a cohort of **20+ master's students**.
- > **Responsibilities:** Designed and graded weekly lab assignments in Python. Conducted tutorials and dedicated doubt-clearing sessions to support students with implementation.

Academic Responsibility

Volunteer coordinator EACL'23 

Review committee member ARR - Feb'25 , EMNLP'24 Industry Track , ARR - June'24 , ARR - April'24 , ARR - February'24 , ACL'23 , EMNLP'22 

Program committee member PoliticalNLP'24 , EMNLP'23 Industry Track , PoliticalNLP'22 

Community Service

Student Representative, Anti-Ragging Cell, IACS

2023 - Current

Actively contribute to fostering a safe and supportive campus environment for all students.

Research and Technical Assistant, Research Scholars' Association, IACS

2023-2024

Liaised between research scholars and Central Scientific Services to guarantee student access to computational resources for research.

System Manager, Research Scholars' Association, IACS

2022-2023

Managed and maintained the online resources for the scholars' association.

References

References will be provided on request.