

Suman Adhya

Research Associate-I

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SKILLS & EXPERTISE

GenAI Stack RAG, LangChain, FAISS, Hugging Face, OpenAI/Gemini/Claude APIs
Languages Python (Proficient), C, R
Frameworks PyTorch, PyTorch Geometric (PyG), TensorFlow, Scikit-learn, Pandas
Tools & Viz Streamlit, Git, Plotly, Sentence-Transformers, Gensim
Expertise LLM Alignment, Generative Models, GNNs, Contrastive Learning

PROFESSIONAL EXPERIENCE

Research Associate-I | *Indian Association for the Cultivation of Science* Jan 2026 – Present

- **LLM Safety & Alignment:** Collaborating on research to develop safety guardrails and alignment methods for LLMs.
- **Agentic AI Evaluation:** Designing frameworks for trajectory-level evaluation to evaluate the planning, reasoning, and multi-step execution of AI agents.

Ph.D. Scholar | *Indian Association for the Cultivation of Science* Oct 2020 – Jan 2026

Publication Venues: *AAAI, ACL, NAACL, IEEE TAI, EACL, ECIR, LREC (workshop).*

- Spearheaded end-to-end applied research in Generative AI, representation learning, and system architecture (detailed in Key Projects below).

EDUCATION

Oct, 2020 – Jan, 2026 **Ph.D., Computer Science, IACS**, India Defended: 15/01/2026
Thesis Title: *Studies on Neural Topic Models for Document Corpora*

Aug, 2018 – Jul, 2020 **M.Sc., Mathematics & Computing, IACS**, India

2015 – 2018 **B.Sc. (Honours), Mathematics**, University of Calcutta, India

KEY PROJECTS

Representation Learning & Structured Knowledge

- **S2WTM: High-Fidelity Latent Representations** [🔗 (ACL '25)]
Leveraged Spherical Sliced-Wasserstein distance to model hyperspherical latent spaces, effectively mitigating posterior collapse. Outperformed Euclidean baselines with a 54.6% NPMI improvement and superior coherence validated by LLMs.
- **GINopic: Graph-Informed Text Modeling** [🔗 (NAACL '24)]
Fused TF-IDF representations with graph-structured knowledge using Graph Isomorphism Networks (GIN). This dual-stream architecture captures global semantic correlations, achieving state-of-the-art coherence and classification accuracy across 5 benchmark datasets.
- **Contrastive Learning for Unsupervised Neural Topic Models** [🔗 (IEEE TAI '25)]
Designed a model-agnostic Decoder Negative Sampling (VAE-DNS) framework compatible with 7 neural architectures. Implemented Triplet Loss to enforce latent space disentanglement, achieving superior cluster separation on Wiki40B (verified via UMAP).

Generative AI Systems & Large-Scale Analysis

- **DTECT: Dynamic Topic Explorer & Context Tracker** [🔗 (AAAI '26 Demo)]
Built a unified end-to-end system for interpreting thematic evolution in text corpora. Developed a scoring method to identify temporally significant terms. Built a retrieval pipeline with FAISS and MMR for diverse document selection, supporting a grounded LLM chat assistant using LangChain.
- **Scalable Analysis of Parliamentary Data** [🔗 (LREC '22)]
Analyzed 298k Q&A pairs via dynamic topic models to quantify policy drift. Detected socio-economic shifts like the 2007 credit card crisis and the post-2016 digital payments transition (UPI).

Model Compression & Efficiency

- **Wasserstein Knowledge Distillation for Topic Models** [🔗 (ECIR '23)]
Engineered a compression framework to distill a hybrid Teacher (BoW + SBERT) into a streamlined SBERT-only Student. Utilized Squared 2-Wasserstein distance to align latent geometries, achieving a model size reduction of 55.4% on 20NG while enabling the compressed student to surpass the teacher's topic coherence.
- **Regularization Dynamics in Generative Models** [🔗 (EACL '23)]
Empirically demonstrated that high dropout rate disrupts representation learning in VAEs, establishing low-dropout protocols ($p < 0.2$) as essential for preserving generation quality in VAEs.

SELECTED PUBLICATIONS

For a complete list, see my [Google Scholar profile](#).

- **Suman Adhya** and Debarshi Kumar Sanyal. [DTECT: Dynamic Topic Explorer & Context Tracker](#). *AAAI*, 2026 (Demo). [🔗] · [🔗]
- **Suman Adhya** and Debarshi Kumar Sanyal. [S2WTM: Spherical Sliced-Wasserstein Autoencoder for Topic Modeling](#). *ACL*, 2025. [🔗]
- **Suman Adhya**, Avishek Lahiri, Debarshi Kumar Sanyal, and Partha Pratim Das. [Evaluating Negative Sampling Approaches for Neural Topic Models](#). *IEEE TAI*, 2025. [🔗]
- **Suman Adhya** and Debarshi Kumar Sanyal. [GINopic: Topic Modeling with Graph Isomorphism Network](#). *NAACL*, 2024. [🔗]
- **Suman Adhya**, Avishek Lahiri, and Debarshi Kumar Sanyal. [Do Neural Topic Models Really Need Dropout? Analysis of Dropout in Topic Modeling](#). *EACL*, 2023. [🔗]
- **Suman Adhya** and Debarshi Kumar Sanyal. [Improving Neural Topic Models with Wasserstein Knowledge Distillation](#). *ECIR*, 2023. [🔗]

AWARDS & LEADERSHIP

- **Competitive Research & Travel Grants:** Awarded multiple grants from ACM India, ANRF, and Microsoft Research to present at top-tier conferences (AAAI '26, ACL '25, EACL '23).
- **INSPIRE-SHE Award (DST):** Nationally recognized for ranking in the top 1% in Class 12th Board Exams.
- **Institutional Leadership (IACS):** Served as Student Representative for the Anti-Ragging Cell, and as Research and Technical Assistant and System Manager for the Research Scholars Association.