Suman Adhya

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Research Interests

Agentic AI • LLM Safety & Alignment • Topic Modeling • NLP • ML

Technical Skills

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

Education

Oct, 2020 – Jan, 2026	**Ph.D., Computer Science**, IACS, India 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

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 2007 credit card crisis and post-2016 digital payments transition (UPI).

Representation Learning & Structured Knowledge

– **S2WTM: High-Fidelity Latent Representations** [(ACL '25)]
Solved posterior collapse in generative models by mapping latent semantics to a unit hypersphere. Utilized Spherical Sliced-Wasserstein distance to achieve a +56% NPMI gain, ensuring robust semantic retrieval for downstream tasks.

– **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 Framework for 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).

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 37.6% - 56.3% (55.4% on 20NG) while enabling the compressed student to surpass the teacher's topic coherence.

– **Regularization Dynamics in Generative Models** [(EACL '23)]
Demonstrated that high decoder dropout disrupts manifold learning in generative models like VAEs. Established 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. [ ]

Grants and Scholarships

- **Travel Grants (ACL 2025):** ACM India-IARCS & ANRF-ITS. 2025
- **ACM India Research Facilitation Grant:** Support for IEEE TAI publication. 2025
- **Travel Grants (NAACL 2024):** MSR Grant & ACM India-IARCS 2024
- **Travel Grants (EACL 2023):** MSR Grant, D&I Team, & Volunteer Coordinator. 2023
- **INSPIRE-SHE Award (DST):** For top 1% rank in National Class 12th Exams. 2015–2018

Community Service

- Student Representative, Anti-Ragging Cell, IACS *2023 - Current*
- Research and Technical Assistant, Research Scholars Association, IACS *2023 - 2024*
- System Manager, Research Scholars Association, IACS *2022 - 2023*