

# Suman Adhya

Research Associate-I @ [IACS](#)

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## SKILLS & EXPERTISE

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<b>GenAI Stack</b>	LLMs, RAG, Prompt Engineering
<b>Languages</b>	Python (Proficient), C, R
<b>Frameworks</b>	PyTorch, Hugging Face, LangChain, PyTorch-Geometric, TensorFlow, Scikit-learn, Pandas, Sentence-Transformers, Gensim
<b>Tools &amp; Viz</b>	Streamlit, Plotly, Matplotlib
<b>Expertise</b>	NLP, Topic Modeling, Unsupervised Representation Learning, Contrastive Learning, VAEs, GNNs, Latent Space Geometry, Knowledge Distillation

## PROFESSIONAL EXPERIENCE

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- Research Associate-I** | *Indian Association for the Cultivation of Science* Jan 16, 2026 – Present
- **LLM Safety & Alignment:** Collaborating on research to develop safety guardrails and alignment methods for LLMs.
- Ph.D. Scholar** | *Indian Association for the Cultivation of Science* Oct 1, 2020 – Jan 15, 2026
- **Publication Venues:** *AAAI (Demo)*, *ACL*, *NAACL*, *IEEE-TAI*, *EACL*, *ECIR*, *LREC (workshop)*.
  - Works included methodological innovations to end-to-end system building (detailed in Key Projects).

## EDUCATION

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- 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

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### Generative AI Systems & Large-Scale Analysis

- **DTECT: Dynamic Topic Explorer & Context Tracker** [[🌐](#) (AAAI '26 Demo)]
  - Built a unified system for tracking thematic evolution, proposing a custom temporal scoring metric to extract salient, trend-setting terms across large text corpora.
  - Engineered an interactive exploration interface powered by a LangChain-driven RAG pipeline, utilizing FAISS and MMR to ground an LLM chat assistant for automatic topic labeling and dynamic querying.
- **Scalable Analysis of Indian Parliamentary Question Hours Data** [[🌐](#) (LREC '22)]
  - Processed 298k+ Lok Sabha Q&A pairs (1999–2019) using dynamic topic models to evaluate the temporal evolution of legislative discourse.
  - Quantified policy drift by mapping extracted topic shifts to socio-economic milestones, including the 2007 credit crisis and the post-2016 digital payments transition.

## Unsupervised Representation Learning

- **S2WTM: Posterior-Collapse-Free Spherical Latent Space Modeling** [🔗 (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).

## 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

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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

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- **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.