Vinayak Gupta

Contact

Artificial Intelligence Research Group
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LinkedIn Google Scholar

Research Interests

AI for Time Series and Health: Developing methods and benchmarks for large models (including LLMs) for time series derived from medical records, health devices, and recommender systems.

Work Experience

Lawrence Livermore National Laboratory Aug. 2024 – Present
Machine Learning Researcher
Managers: Ruben Glatt, Priyadip Ray & Bhavya Kailkhura
Developing a foundational model for bio-molecules, including DNA, RNA, and proteins, while also modeling electronic health record (EHR) data to uncover patterns in patient medical histories.

University of Washington, Seattle Apr. 2023 – May 2024
Postdoctoral Researcher
Advisor: Tim Althoff
Designed language models that can *understand* multi-modal data including time-series and text. Also, worked on defending LLMs against a wide range of hijacking and prompt-injection attacks.

IBM Research Aug. 2022 – Mar. 2023
Research Scientist
Manager: Sameep Mehta
With the Data & AI team, I worked on enabling Watson-Core to perform business intelligence tasks such as data denoising, feature aggregation, etc., using only text commands over IBM cloud.

Amazon Jan. 2022 – Jun. 2022
Applied Scientist-II Intern
Manager: Samik Datta
Created time-sensitive coupon distribution methods for customers with the Amazon Pay ML team.

Indian Institute of Technology, Delhi Jul. 2017 – Jan. 2022
Research Scholar
Advisors: Srikanta Bedathur & Abir De
Designed sequential point processes and graph models for recommender systems, missing data imputation, large-scale time series retrieval, and spatial data modeling.

Siemens Healthcare May 2016 – Jan. 2017
Research Intern
Manager: Sultan Haider
Developed computer vision models to improve the radiography imaging quality in Multimobil 5C.

Education

Indian Institute of Technology (IIT) Delhi 2017 – 2022
Ph.D. in Computer Science & Engineering.
Institute Nominee for ACM SIGKDD and ACM India Doctoral Dissertation Awards.

Indian Institute of Information Technology (IIIT) Jabalpur 2013 – 2017
B.Tech. in Computer Science & Engineering.

Awards and Honors

Spotlight Award at NeurIPS - Top 5% of all submissions.	2024
Distinction for Doctoral Research: Institute-wide recognition for top 10% of all PhDs.	2023
IIT Delhi's Nominee for ACM SIGKDD and ACM India Doctoral Dissertation Awards.	2023
NASSCOM AI Game-Changers of India: Runner-Up in ML Fundamentals Category.	2022
Expert Talk at IndiaAI: Organized by NASSCOM and Ministry of IT – Govt. of India.	2022
Microsoft and Google (Declined) Travel Grant to attend ACM SIGKDD.	2022
Outstanding Doctoral Paper Award: The First Intl. Conference on AI-ML Systems.	2021
ACM SIGIR Student Grant for CIKM.	2021

Siemens Healthcare R&D Tech-Intern Rating of 1 (Highest Possible). 2017

All India 9th Rank in ABU Asia-Pacific Robocon. 2015

Project selected for 'Make In India' – Govt. of India's Flagship Manufacturing Initiative. 2015

A1 (Highest Possible) Grade for All Subjects and Merit Award in Senior High School. 2013

Under Review

Efficient and Responsible Adaptation of Large Language Models for Robust and Equitable Top-k Recommendations.
K. Kaur, M. Chadha, **V. Gupta**, and C. Shah.

SPML: A DSL for Defending Language Models Against Prompt Attacks.
R. Sharma, **V. Gupta**, and D. Grossman.

Conference and Journal Publications

Differentiable Adversarial Attacks for Marked Temporal Point Processes.
P. Chakraborty*, **V. Gupta***, R. Rahul, S. Bedathur, and A. De.
AAAI Conference on Artificial Intelligence (**AAAI**), 2025.

Are Language Models Actually Useful for Time Series Forecasting?
M. Tan, M. Merill, **V. Gupta**, T. Althoff, and T. Hartvigsen.
Neural Information Processing Systems (**NeurIPS**), 2024. **(Spotlight)**

Language Models Still Struggle to Zero-shot Reason about Time Series.
M. Merill, M. Tan, **V. Gupta**, T. Hartvigsen, and T. Althoff.
Empirical Methods in Natural Language Processing (**EMNLP**) Findings, 2024.

Tapestry of Time and Actions: Modeling Human Activity Sequences using Temporal Point Process Flows.
V. Gupta and S. Bedathur.
ACM Transactions on Intelligent Systems and Technology (**TIST**), 2023.

Retrieving Continuous Time Event Sequences using Neural Temporal Point Processes with Learnable Hashing.
V. Gupta, S. Bedathur, and A. De.
ACM Transactions on Intelligent Systems and Technology (**TIST**), 2023.

Modeling Spatial Trajectories using Coarse-Grained Smartphone Logs.
V. Gupta and S. Bedathur.
IEEE Transactions on Big Data (**TBD**), 2023.

Teaching Old DB Neural Tricks: Learning Embeddings on Multi-tabular Databases.
G. Gaur, R. Singh, S. Arora, **V. Gupta**, and S. Bedathur.
International Conference on Data Science & Management of Data (**CODS-COMAD**), 2023.

Learning Temporal Point Processes for Efficient Retrieval of Continuous Time Event Sequences.
V. Gupta, S. Bedathur, and A. De.
AAAI Conference on Artificial Intelligence (**AAAI**), 2022.

ProActive: Self-Attentive Temporal Point Process Flows for Activity Sequences..
V. Gupta and S. Bedathur.
ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD**), 2022.

Modeling Continuous Time Sequences with Intermittent Observations using Marked Temporal Point Processes.
V. Gupta, S. Bedathur, S. Bhattacharya, and A. De.
ACM Transactions on Intelligent Systems and Technology (**TIST**), 2022.

Doing More with Less: Overcoming Data Scarcity for POI Recommendation via Cross-Region Transfer.
V. Gupta and S. Bedathur.
ACM Transactions on Intelligent Systems and Technology (**TIST**), 2022.

Learning Temporal Point Processes with Intermittent Observations.
V. Gupta, S. Bedathur, S. Bhattacharya, and A. De.
Conference on Artificial Intelligence and Statistics (**AISTATS**), 2021

Region Invariant Normalizing Flows for Mobility Transfer.
V. Gupta and S. Bedathur.
Conference on Information and Knowledge Management (**CIKM**), 2021.

Modeling Implicit Communities from Geo-tagged Event Traces using Spatio-Temporal Point Processes.
A. Likhyani*, **V. Gupta***, P. K. Srijith, P. Deepak, and S. Bedathur.
Conference on Web Information Systems Engineering (**WISE**), 2020.

LBRR: Load Balanced Ring Routing Protocol for Heterogeneous Sensor Networks with Sink Mobility.
S Maurya*, **V. Gupta***, and V. K. Jain.
IEEE Wireless Communications and Networking Conference (**WCNC**), 2017.

Workshops and Tutorials

Enhancing Biological Insights with Knowledge-Driven Multi-Modal RNA Models.
M. Qiu, ..., **V. Gupta**, B. Bartoldson, B. Kailkhura, T. Chen.
US DOE Workshop on Envisioning Frontiers in AI and Computing for Biological Research, 2025.

Defending Language Models Against Image-Based Prompt Attacks via User-Provided Specifications.
R. Sharma, **V. Gupta**, and D. Grossman.
Workshop on Security Architectures for Gen. AI (**SAGAI**), colocated with IEEE S&P 2024.

Are Language Models Actually Useful for Time Series Forecasting?
M. Tan, M. Merill, **V. Gupta**, T. Althoff, and T. Hartvigsen.
1st UVA Workshop on Large Language Models for Science and Engineering. **(Lightning Talk)**

IBM Tutorial on Advances in NLP Research for Automated Business Intelligence.
V. Gupta, C. Rajmohan, R. Chaudhuri, A. Gupta, B. Ganesan, A. Agarwal, S. Mehta.
International Conference on Natural Language Processing (**ICON**). 2022.

Modeling Human Actions in Time-Stamped Activity Sequences.
V. Gupta and S. Bedathur.
Workshop on Applied ML for Time-Series Forecasting (**AMLTS**), colocated with CIKM 2022.

Learning Neural Models for Continuous-Time Sequences
V. Gupta.
International Conference on AI-ML Systems (**AI-ML Systems**). 2021. **(Best Doctoral Paper)**

Neural Approach for Modeling Continuous Time Sequences with Missing Observations.
V. Gupta.
ACM India Academic Research and Careers for Students (**ARCS**). 2021. **(Oral)**

Grants

Microsoft Accelerate Foundation Models Research Program
Principal Investigator(s): Tom Hartvigsen and Tim Althoff.

UW eScience Institute: Azure Cloud Credits for Research
Principal Investigator(s): Tim Althoff.

Government Recognition

AI Experts at IndiaAI: Initiative by Ministry of IT, Govt. of India. Oct. 2022
Article: "Read and Watch Lectures to Build a Foundation".

Skills

- **Proficient**: Python, Pytorch, Tensorflow, HuggingFace, Azure, and IBM Cloud.
- **Intermediate**: Keras, C++, MATLAB, PySpark, and AWS.

Selected Talks

"Do we need Large Language models for Time Series"
- Computational Engineering Seminar at LLNL. Dec. 2024
- AI Seminar: University of Southern California, LA. (▶ Video Link) Nov. 2024

"Time Series Mining with and without Language Models"
- Allen Institute, Seattle. Apr. 2024
- Lawrence Livermore National Laboratory. May 2024
- Snap Inc. Jun. 2024
- UW Data Science Group Meeting. Nov. 2023

"Modeling Time Series for Recommendation and Other Applications"

- Georgia Institute of Technology, Atlanta. Oct. 2022
- University of Michigan, Ann Arbor. Oct. 2022
- University of Washington, Seattle. Sep. 2022
- University of California, San Diego. Sep. 2022
- University of Notre Dame, Indiana. Sep. 2022
- IBM India Research Lab, Bangalore. Jun. 2022
- Technical University of Munich, Germany. Jun. 2022

"Large Scale Retrieval of Continuous-Temporal Sequences"

- NASSCOM AI Game-Changers of India Ceremony. Jun. 2022
- Amazon Research Days. Dec. 2021

"Learning Neural Models for Temporal Sequences with Missing Events"

- ACM India Research and Careers for Students Symposium. Feb. 2022
- Doctoral Symposium: Conference on AI-ML Systems. Nov. 2021
- MIT-IBM Watson Research Lab, Boston. Sep. 2019

"Thinking Beyond Complete Data with Neural Temporal Point Processes"

- Research Symposium: IIT Delhi. Dec. 2019
- PhD Seminar: CSE IIT Delhi. Jul. 2019

"Maxima: Electronic Mask for Patients with Exercise-Induced Asthma"

- Siemens Innovation Research Lab Exhibition (IRLE) at Erlangen, Germany. Jul. 2016
- Make-In-India Quality Improvement Programme (QIP). Dec. 2015

Invited Panelist for Discussions

- Career Mentorship Program at Machine Learning for Health (ML4H). Dec. 2023

Student Mentoring

- Reshabh K Sharma — 2023 – 2024
  PhD Student, UW CSE.
- Pritish Chakraborty — 2023 – 2024
  PhD Student, IIT Bombay CSE.
- Mike A. Merill — 2023 – 2024
  PhD Student, UW CSE.
- Rajat Singh — 2021 – 2023
  PhD Student, IIT Delhi CSE.
- Ritvik Vij — 2021 – 2022
  M.S. Student, IIT Delhi CSE → Applied Scientist @ Amazon.
- Abhishek Singh — 2021 – 2022
  B.S. Student, IIT Delhi → Software Engineer @ Standard Chartered.
- Siddhant Arora — 2019 – 2020
  M.S. Student, IIT Delhi CSE → PhD Student @ CMU LTI.
- L. Hari Narayanan — 2019 – 2020
  Intern, IIT Delhi CSE → Software Engineer @ Microsoft.

PC Member

AAAI, IJCAI, SIGIR, WSDM, WWW, ECML-PKDD, ACM TOIS, and IEEE TPAMI.

Teaching Experience

- **Graduate Instructor**: Information Retrieval, Machine Learning, Data Mining, Data Structures, Computer Networks, and Intro. to Programming.
- **Grader**: Reinforcement Learning, Deep Learning, Computer Architecture, Network Security, Software Engineering, and Applied Game Theory.

Services

- System admin of four high-performance GPU servers at IIT Delhi. 2018 – 2022
- IIT Delhi CSE Ph.D./M.S. Graduate Admissions Committee. 2020 – 2021
- U.G. Counseling Committee. 2015 – 2017