

## Education

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### Indian Institute of Technology Kharagpur

2018 - 2023

*B.Tech (Honours) and M.Tech (Dual Degree) in Electrical Engineering. CGPA: 8.82/10*

*Minor in Computer Science, specialization in Artificial Intelligence. CGPA 9.01/10*

🏆 **Best Master Thesis Award.** (top 10 in ~2000 students) Advisor: Prof. Pawan Goyal

## Work Experience

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P: Preprint, C: Conference, W: Workshop, J: Journal

November 2023 - Present

### Google DeepMind

Researcher

Advisors: Dr. Partha Talukdar & Shachi Dave

Collaborators: Dr. Vinodkumar Prabhakaran & Dr. Zi Wang & Prof. Adji Bousso Dieng & Dr. Marco Andreetto

Project(s): Measuring cultural competence in diffusion-based text-to-image models ; Proactive agents for multi-turn text-to-image under uncertainty ; Double sampling and guidance for diverse diffusion models. **Publications:** C4, P1

### Amazon Science, United Kingdom

June - November, 2023

*Applied Scientist in Machine Learning for Ranking Group*

Advisors: Dr. Yao Ma

Collaborators: Dr. Gerrit J.J. van den Burg & Jean Baptiste Faddoul

Project(s): Efficient pointwise-pairwise framework for ranking with theoretical guarantees. **Publications:** C3

### Amazon Alexa AI, Germany

June - September, 2022

*Applied Scientist Intern in Alexa Natural Understanding Group*

Advisors: Dr. Caglar Tirkaz & Dr. Abdalghani Abujabal

Project(s): Controllable data augmentation for multilingual dialogue systems.

### IBM Research, India (remote)

May - July, 2021

*Research Intern in Neuro-Symbolic AI Group*

Advisors: Dr. Shajith Iqbal

Project(s): Improved temporal question answering over knowledge bases (KB) via textual extraction. **Publications:** C2

🏆 Awarded **Outstanding Intern Award** (1 in ~25 interns) from the Director of IBM Research, India

### Complex Networks (CNeRG) Research Group, IIT Kharagpur

2021 - 2023

*Student Researcher*

Advisors: Dr. Pawan Goyal

Collaborators: Dr. Rajdeep Mukherjee

Project(s): Prompt-based contrastive pre-training for aspect sentiment triplet extraction ; Improved cross-lingual generation using meta-learning ; Leveraging character sequence information for document understanding. **Publications:** C1, W1

## Publications

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P: Preprint, C: Conference, W: Workshop, J: Journal. \* - equal contribution

### P1 Proactive Agents for Multi-Turn Text-to-Image Generation Under Uncertainty

Meera Hahn, Wenjun Zheng, Nithish Kannen, Rich Galt, Kartikeya Badola, Been Kim and Zi Wang.  
*arXiv:2007.02519 (under review at ICLR, 2025).*

### C4 Beyond Aesthetics: Cultural Competence in Text-to-Image Models.

Nithish Kannen, Arif Ahmad, Marco Andreetto, Vinodkumar Prabhakaran. Utsav Prabhu, Adji Bousso Dieng, Pushpak Bhattacharaya and Shachi Dave.

*Neural Information Processing Systems (NeurIPS) Dataset and Benchmarks Track, 2024 (Poster)*

### C3 Efficient Pointwise-Pairwise Learning-to-Rank for News Recommendation.

Nithish Kannen\*, Yao Ma\*, Gerrit J.J. van den Burg and Jean Baptiste Faddoul

*Empirical Methods in Natural Language Processing (EMNLP) Findings, 2024. (Poster)*

### C2 Best of Both Worlds: Towards Improving Temporal Knowledge Base Question Answering via Targeted Fact Extraction.

Nithish Kannen, Udit Sharma, Sumit Neelam, Dinesh Khandelwal, Shajith Iqbal, Hima Karanam, L Subramaniam

*Proceedings of Empirical Methods in Natural Language Processing (EMNLP), 2023 (Poster) & NLP for Wikipedia workshop @ EMNLP 2024 (Oral).*

## C1 CONTRASTE: Supervised Contrastive Pre-training With Aspect-based Prompts For Aspect Sentiment Triplet Extraction.

Rajdeep Mukherjee, Nithish Kannen, Saurabh Kumar Pandey and Pawan Goyal.  
*Empirical Methods in Natural Language Processing (EMNLP) Findings, 2023. (Poster)*

## W1 CABACE: Injecting Character Sequence Information and Domain Knowledge for Enhanced Acronym and Long-Form Extraction.

Nithish Kannen, Divyanshu Sheth, Abhranil Chandra and Shubhraneel Pal.  
*Scientific Document Understanding workshop @AAAI, 2021 (Virtual).*

## J1 Smart factories of Industry 4.0: Determination of the Effective Smartphone Position for Human Activity Recognition using Deep Learning.

Nithish Kannen and Abdulhamit Subasi  
*Book Chapter in Advanced Signal Processing for Industry 4.0.*

## Talks

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- **Cultural Diversity in Generative AI Models**
  - Gemini i18n Summit, Google DeepMind *December 2024*
- **Beyond Aesthetics: Do Text-to-Image Models Equally Serve Everyone?**
  - Cola Discussion Forum, Google Docs AI, India *October 2024*
  - Open Data Science Conference (OSDC) Europe [Coverage] [Talk] *September 2024*
  - Chaupal, Google Research *June 2024*
- **Tutorial on Diffusion Models**
  - Reading group, Google DeepMind India *Aug 2024*
- **Best of Both Worlds: Temporal KBQA Leveraging Text Data**
  - NLP4Wikipedia @ EMNLP 2024 (Oral) *Nov 2024*
- **Learning from Heterogenous Data Sources**
  - IBM Research India *July 2024*
  - Google Research *March 2024*
- **Improved Training Stability in Ranking Models**
  - Amazon Science. London *October 2023*
- **Do Prompting Models Really Understand Prompts?**
  - Amazon Science, London *July 2023*
  - Amazon Alexa AI, Berlin *August 2022*

## Selected Awards and Honors

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- Secured **99.96** percentile in **JEE Main** and **JEE Advanced 2018** (among 1.5 million) aspirants in India. *2018*
- **Among top 10**, from ~2000 IIT students to be awarded the **Best Thesis Award** for work done during Masters. *2023*
- **Among 12**, from 20,000 applicants selected for the prestigious **Google Pre-Doctoral Researcher Program**. *2023*
- **Among top 30** to receive the **Best Maths Student** award in the **National Mathematics Olympiad**. *2016*
- **Among 50**, from India & Singapore selected for (10,000+ applicants) Research Week with Google (NLP track). *2021*
- **Among 300** globally to receive scholarship through the **AWS Machine Learning Scholarship Program**. *2020*
- **Among 22** selected nationally for an undergraduate research internship at **IBM Research, India** during 2021. *2021*
- Received **Outstanding Intern Award** award (one among 25) for work done during IBM Research internship. *2021*
- Led a team of 12 members to win the **Gold Medal** in Inter IIT competition held on High-Resolution Imaging. *2023*
- Secured a rank of **1391** in **Google Kick Start** and **467** in **Leetcode Contest 53**. *2021*

## Coursework

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- **Institute Courses:** Algorithms, Probability & Statistics, Machine Learning, Deep Learning, Image Processing, Artificial Intelligence & Applications, Natural Language Processing, Computer Architecture & Operating Systems, Embedded Systems, Transform Calculus, Signal Processing, Signals & Networks, Digital Electronics
- **MOOCs:** Applied Data Structures & Algorithms (AlgoZenith), Deep Learning Specialization (Coursera), Computer Vision A-Z: OpenCV, SSD & GANs (Udemy), Advanced NLP & RNNs (Udemy)

## Selected Research Projects

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### Cultural Competence in Text-to-Image Models [C4]

Jan 2024 - Jun 2024

Advisor(s): Shachi Dave, Dr. Vinodkumar Prabhakaran -*Google DeepMind*

- Introduced CUBE, a novel benchmark to comprehensively evaluate cultural competence of text-to-image models.
- Developed human evaluation pipelines and a novel cultural diversity (CD) T2I evaluation based on Vendi score.
- Demonstrated significant gaps in cultural awareness and diversity, and discussed pareto fronts in SOTA T2I models

### Proactive Agents for Multi-Turn Text-to-Image Generation under Uncertainty [P1]

Mar 2017 - May 2017

Advisor(s): Dr. Zi Wang & Dr. Been Kim -*Google DeepMind*

- Developed proactive T2I agents with a symbolic belief state to address prompt underspecification and uncertainty.
- Evaluated the agent using self-play strategy to simulate multi-turn clarification seeking interactions of agent.
- Demonstrated significant improvements in image generation quality and user experience on COCO and DesignBench.

### Efficient Pointwise-Pairwise Learning-to-Rank Framework [C3]

Mar 2017 - May 2017

Advisor: Dr. Yao Ma & Dr. Gerrit J.J. van den Burg -*Amazon Science*

- Proposed a novel combination of pointwise and pairwise preference models for efficient ranking using LLMs.
- Developed a theoretical framework based on markov chains to derive provable guarantees for ranking improvements.
- Proposed strategy outperforms existing pointwise ranking by  $\sim 2.4\%$  with a **scalable  $O(N)$**  middle-ground.

### Towards Improved Temporal KBQA Leveraging Textual Fact Extraction [C2]

Mar 2017 - May 2017

Advisor: Dr. Shajith Iqbal -*IBM Research*

- Identified key shortcomings in temporal QA over knowledge graphs (KB) attributed to incompleteness and entity linking.
- Devised a novel targeted fact extraction strategy from textual resources to compensate for gaps in knowledge bases.
- Proposes strategy combining the strengths of heterogeneous sources (KB + text) improved temporal QA F1 by  $\sim 20\%$ .

### Prompt-based Contrastive Pretraining for Aspect-based Sentiment Analysis [C1]

Mar 2017 - May 2017

Advisor: Dr. Pawan Goyal -*Master Thesis, IIT KGP*

- Proposed a novel **prompt-based contrastive** pretraining approach to enhance fine-grained sentiment understanding.
- Proposed pretraining strategy achieved state-of-the-art results across ABSA tasks, outperforming previous methods.

## Responsibilities

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- **Reviewing:** ACL (2022-Present), NeurIPS (2024), EMNLP (2023 - present), ICLR (2024), NAACL (2023 - present).
- **Organizer | NLP Reading Group at Google DeepMind, India**  
Co-organized reading group sessions featuring presentations from both internal groups and external researchers, fostering collaboration and knowledge sharing within our group. Personally responsible for inviting and organizing 6+ speakers.
- **TA for Signals and Systems (EE21201) | Instructor: Mohammadul Haque**  
Responsible for designing exam questions and grading answer copies. Conducted tutorial sessions.
- **Senior Member | Team IIT KGP, Inter IIT Contingent**  
Responsible for advising the contingent on Deep Learning and Vision representing IIT KGP at Inter IIT competitions.
- **Lead | Team KGP, SDU Workshop Shared Task @ AAAI**  
Led a group of 4 members to participate in the Acronym extraction competition at SDU Workshop (AAAI 2021). Secured #1 on French and top 3 on the leaderboard. Paper accepted for oral presentation at SDU@AAAI 2021.
- **Core Member | Kharagpur Data Analytics Group (KDAG)**  
Conducted knowledge meetings and released campus wide blogs on ML. Organized campus-wide talks and interest groups.
- **Senior Member | IIT Tech Ambit**  
Official tech magazine of the IITs, developed at IIT Kharagpur to highlight in-house research and their impact. Authored articles for monthly magazines. Interviewed stakeholders to gather insights into research accomplishments.

## Skills

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- **Programming Languages:** Python, C++, , C, MATLAB, Assembly Language
- **Software Tools:** PyTorch, Tensorflow, JAX, Git, Numpy, Pandas, Spacy, OpenCV, SQL, Scipy, PyMongo, Linux
- **Data Visualization:** Seaborn, Matplotlib, Tableau
- **Technology & Expertise:** Natural Language Processing, Generative AI, Fairness, Multimodal Models, Deep Learning, Machine Learning, Competitive Programming, Time Series, Object Oriented Programming, Sensor Analytics, Embedded Systems, Android Development, Signal Processing, Probability & Statistics, Linear Algebra, Data Structures
- **Languages:** English (proficient), Tamil (native), Hindi (intermediate)