Nithish Kannen

Google DeepMind

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Education

Indian Institute of Technology Kharagpur *2018 - 2023*
B.Tech (Honours) and M.Tech (Dual Degree) in Electrical Engineering. ***CGPA:** 8.75/10*
Minor in Computer Science, Specialization in Artificial Intelligence. ***CGPA:** 8.96/10*

🏆 **Best Master Thesis Award** (top 10 in ∼2000 students) in recognition of exceptional research contribution.

Work Experience

PT: Patent, T: Tech Report, C: Conference, W: Workshop, J: Journal

Google DeepMind *July 2025 - Present*
Research Engineer
Part of the core Gemini and Nano Banana team working on thinking and reinforcement learning for diffusion.

Google DeepMind *November 2023 - Jun 2025*
AI Resident
Managers: Dr. Partha Talukdar,
Collaborators: Dr. Vinodkumar Prabhakaran, Dr. Zi Wang, Dr. Been Kim, Prof. Adji Bousso Dieng, Dr. Marco Andreetto
Projects: Overthinking and efficiency in reasoning models ; Measuring cultural competence in diffusion-based text-to-image models ; Proactive agents for multi-turn text-to-image under uncertainty ; Guidance for diverse diffusion models ; Impact: Contributions to Gemini 2.5 and Imagen 4. Led open-source code release of 2 publications: CUBE (C4) and Proactive Agents (C5); Co-inventor of 1 patent (PT1)

Amazon Science, United Kingdom *June - November, 2023*
Applied Scientist Intern in Machine Learning for Ranking Group
Advisors: Dr. Yao Ma
Collaborators: Dr. Gerrit J.J. van den Burg, Dr. Jean Baptiste Faddoul
Project: 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: Controllable data augmentation for multilingual dialogue systems.

IBM Research, India (remote) *May - July, 2021*
Rearearch Intern in Neuro-Symbolic AI Group
Advisor: Dr. Shajith Ikbal
Project: 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
Projects: 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 & Patents

PT: Patent, T: Tech Report, C: Conference, W: Workshop, J: Journal. * - equal contribution

P1 Fine-Tuning Diffusion Models via Intermediate Distribution Shaping
Gautham Govind, **Nithish Kannen***, Shaan Ul Haque*, Dheeraj Nagaraj, Sanjay Shakkottai, Karthikeyan Shanmugam

T1 Gemini 2.5: Pushing the Frontier with Advanced Reasoning, Multimodality, Long Context, and Next Generation Agentic Capabilities
Gemini Team, Google DeepMind (includes **Nithish Kannen**)
Google DeepMind Tech Report

C5 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.
*International Conference on Machine Learning (**ICML**), 2025.*

C4 Beyond Aesthetics: Cultural Competence in Text-to-Image Models.
<u>Nithish Kannen</u>, Arif Ahmad, Marco Andreetto, Vinodkumar Prabhakaran. Utsav Prabhu,
Adji Bousso Dieng, Pushpak Bhattacharrya and Shachi Dave.
*Neural Information Processing Systems (**NeurIPS**) Dataset and Benchmarks Track, 2024*

C3 Efficient Pointwise-Pairwise Learning-to-Rank for News Recommendation.
<u>Nithish Kannen</u>*, Yao Ma*, Gerrit J.J. van den Burg and Jean Baptiste Faddoul
*Empirical Methods in Natural Language Processing (**EMNLP**) Findings, 2024.*

C2 Best of Both Worlds: Towards Improving Temporal Knowledge Base Question Answering via Targeted Fact Extraction.
<u>Nithish Kannen</u>, Udit Sharma, Sumit Neelam, Dinesh Khandelwal, Shajith Ikbal, Hima Karanam, L Subramaniam
*Proceedings of Empirical Methods in Natural Language Processing (**EMNLP**), 2023* &
*NLP for Wikipedia workshop @ EMNLP 2024 (**Oral**).*

C1 CONTRASTE: Supervised Contrastive Pre-training With Aspect-based Prompts For Aspect Sentiment Triplet Extraction.
Rajdeep Mukherjee, <u>Nithish Kannen</u>, Saurabh Kumar Pandey and Pawan Goyal.
*Empirical Methods in Natural Language Processing (**EMNLP**) Findings, 2023.*

W1 CABACE: Injecting Character Sequence Information and Domain Knowledge for Enhanced Acronym and Long-Form Extraction.
<u>Nithish Kannen</u>, Divyanshu Sheth, Abhranil Chandra and Shubhraneel Pal.
*Scientific Document Understanding workshop @**AAAI**, 2021 (Poster).*

J1 Smart factories of Industry 4.0: Determination of the Effective Smartphone Position for Human Activity Recognition using Deep Learning.
<u>Nithish Kannen</u> and Abdulhamit Subasi
Book Chapter in Advanced Signal Processing for Industry 4.0.

PT1 Multi-Turn Collaboration for Machine-Learned Inference
Co-inventor (includes <u>Nithish Kannen</u>)
Google DeepMind Patent

Talks

- **Fairness in Text-to-Image Models**
  - Wadhwani School of Data Science and AI, IIT Madras [Coverage] [Talk]   *July 2025*
- **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 (ODSC) 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

- Recieved Spot Bonus Award from the **CTO** of Google DeepMind for contribution to Gemini 2.0+ models.
- Secured **99.96 percentile** in **Joint Entrance Examination (JEE)** (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 **top 30** nationally to receive the **Best Maths Student** award in the **National Mathematics Olympiad** *2016*
- Among **12**, selected from 20,000 worldwide applicants for **Google Pre-Doctoral Researcher Program**. 2023
- 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*
- Among **50**, from India & Singapore selected for (10,000+ applicants) Research Week with Google (NLP track). *2021*
- Among **25** selected nationally for an Research Internship at **IBM Research, India** during 2021. *2021*
- Secured a rank of **1391** in **Google Kick Start** and **467** in **Leetcode Contest 53**. *2021*
- Among **300** globally to receive scholarship through the **AWS Machine Learning Scholarship Program**. *2020*

Responsibilities

- **Reviewing:** ACL (2022-Present), NeurIPS (2025), 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). 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.

Selected Open-Sourced Research Projects

Cultural Competence in Text-to-Image Models [C4]   *Jan 2024 - Jun 2024*
Advisors: Shachi Dave, Dr. Vinodkumar Prabhakaran   Google DeepMind

- Introduced CUBE, a novel benchmark to comprehensively evaluate **cultural competence** in **text-to-image models**.
- Developed human evaluation pipelines and a **novel cultural diversity** 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]   *Jun 2024 - Present*
Advisors: Dr. Zi Wang, Dr. Been Kim   Google DeepMind

- Developed proactive T2I agents that expose **uncertainty** in user prompts with **probabilistic belief graphs**.
- 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]   *Jun 2023 2017 - Nov 2023*
Advisors: 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 ∼**2.4%** with a **scalable O(N)** middle-ground.

Towards Improved Temporal KBQA Leveraging Textual Fact Extraction [C2]   *Mar 2022 - Sep 2023*
Advisor: Dr. Shajith Ikbal   IBM Research

- Identified key shortcomings in **temporal QA** over **knowledge graphs** 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 ∼**20%**.

Coursework

- **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:** Deep Learning Specialization (Coursera), Computer Vision A-Z (Udemy), Advanced NLP & RNNs (Udemy)