Rachit Bansal

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EDUCATION

Delhi Technological University — New Delhi, India
B.Tech. in Electrical Engineering — 2022

- Received the **Research Excellence Award** for my bachelor's thesis work—one of the highest honors for research at the university. The only undergraduate student to have received the award.

EXPERIENCE

Google Research
Pre-doctoral Researcher (Advisor: Dr. Partha Talukdar) — July 2022–Present

Studying composition of language models as a means to augment new knowledge.

- Led a large cross-team collaboration to introduce a new paradigm of composition of language models: Using knowledge-specific models to augment new knowledge in a large language model.
- Submitted our work to ICLR and presented at the prestigious Google Research Conference. Working with Google DeepMind and the Bard team to evaluate our approach for serving custom models to users.

Technion – Israel Institute of Technology
Research Intern (Advisor: Prof. Yonatan Belinkov) — Sept 2021–July 2022

Establishing relationship between intrinsic neuron activations and model behavior.

- For the first time, we showed that intrinsic properties of a neural network, such as the information distribution across neurons, strongly correlate with its generalization behavior.
- Presented this bachelor's thesis work at NeurIPS 2022 and received lauding feedback.

Adobe Research
Research Intern (Host: Balaji Krishnamurthy) — Jan 2021–Sept 2021

Towards grounding language model generations to factual and commonsense knowledge.

- Theorised and established task-agnostic frameworks to augment language model inputs with factual and commonsense knowledge on the fly.
- Received a full-time offer post a celebrated internship: Publishing 2 papers at NAACL and 2 US patents.

IIIT Delhi
Research Intern (Advisor: Prof. Tanmoy Chakraborty) — May 2020–April 2021

Retrieving and detecting closed-domain misinformation across social networks.

PUBLICATIONS

[1] *LLM Augmented LLMs: Expanding Capabilities through Composition*
Rachit Bansal, Bidisha Samanta, Siddharth Dalmia, Nitish Gupta, Shikhar Vashishth, Sriram Ganapathy, Abhishek Bapna, Prateek Jain, Partha Talukdar.
International Conference on Learning Representations (**ICLR**) 2024 (under review) [Preprint]

[2] *Linear Connectivity Reveals Generalization Strategies*
Jeevesh Juneja, Rachit Bansal, Kyunghyun Cho, João Sedoc, Naomi Saphra.
– International Conference on Learning Representations (**ICLR**) 2023
– Workshop on Spurious correlations, Invariance, and Stability (SCIS) at **ICML** 2022 [Print, Code]

[3] *Measures of Information Reflect Memorization Patterns*
Rachit Bansal, Danish Pruthi, Yonatan Belinkov.
Conference on Neural Information Processing Systems (**NeurIPS**) 2022 [Print, Website]

[4] *Evaluating Explanations: How much do explanations from the teacher aid students?*
Danish Pruthi, Rachit Bansal, Bhuvan Dhingra, Livio Baldini Soares, Michael Collins, Zachary C. Lipton, Graham Neubig, William W. Cohen.
Transactions of the Association for Computational Linguistics (**TACL**) [Print, Code]

[5] *CoSe-Co: Text Conditioned Generative CommonSense Contextualizer*
Rachit Bansal, Milan Aggarwal, Sumit Bhatia, Jivat Kaur, Balaji Krishnamurthy.
– North American Chapter of the Association for Computational Linguistics (**NAACL**) 2022
– Workshop on Commonsense Reasoning and Knowledge Bases at **AKBC** 2021 [Print, Video]

[6] *LM-CORE: Language Models with Contextually Relevant External Knowledge*
Jivat Kaur, Sumit Bhatia, Milan Aggarwal, Rachit Bansal, Balaji Krishnamurthy.
– North American Chapter of the Association for Computational Linguistics (**NAACL**) Findings 2022
– Workshop on Commonsense Reasoning and Knowledge Bases at **AKBC** 2021 [Print, Video]

[7] *How Low is Too Low? A Computational Perspective on Extremely Low-Resource Languages*
Rachit Bansal, Himanshu Choudhary, Ravneet Punia, Niko Schenk, Jacob L Dahl, Émilie Pagé-Perron.
Student Research Workshop (SRW) at **ACL** 2021 [Print, Slides, Code]

[8] *Combining exogenous and endogenous signals with a co-attention network for early fake news detection*
Rachit Bansal, William Scott, Nidhi Sultan, Tanmoy Chakraborty.
Pacific-Asia Conference on Knowledge Discovery and Data Mining (**PAKDD**) 2021 [Print, Slides]

[9] *Cross-SEAN: A Cross-Stitch Semi-Supervised Attention Model for COVID-19 Fake News Detection*
Rachit Bansal, William Scott, Abhay Kaushik, Tanmoy Chakraborty, Shubhashis Sengupta.
Journal of Applied Soft Computing [Print]

ACADEMIC COLLABORATIONS AND PROJECTS

Studying Linear Mode Connectivity
(w/ CILVR Lab at NYU: Dr. Naomi Saphra, Prof. Joao Sedoc, Prof. Kyunghyun Cho)
Studied linear model connectivity in loss surfaces of pre-trained language models. Observed unconventional clusters of models lying in separate loss basins showing characteristic out-of-domain properties. I executed the foundational implementations for studying mode connectivity and supported further analysis.

Evaluating Model Explanations
(w/ LTI CMU: Danish Pruthi, Prof. Zachary Lipton, Prof. Graham Neubig)
Established a student-teacher communication paradigm for automatic evaluation of saliency-based attribution methods. I led the development of the paradigm for generative tasks and enhanced our TACL paper by inculcating empirical findings over multiple review cycles.

Machine Translation for Sumerian
(as a part of *Google Summer of Code (GSoC)* 2020)
Sumerian is the earliest documented language in Mesopotamia, and perhaps the world—dating back to the end of 4th millennium BC from current-day southern Iraq. I led this collaboration with the Cuneiform Digital Library Initiative (CDLI) and University of Oxford to adapt a number of NMT techniques for Sumerian translation. We built an end-to-end information extraction pipeline for Sumerian [Code: 1, 2].

FEATURED TEACHING AND POSITIONS

Mentor: Google Summer of Code (GSoC) 2021
Cuneiform Digital Library Initiative (CDLI)

Student Instructor: Reinforcement Learning 2020
Coding Blocks
Recorded 10-hours worth of lectures and held a number of live webinars. Collaborated with course mentors to build project ideas, assignments, and quizzes.

Teaching Assistant: Machine Learning with Deep Learning 2019
Coding Blocks
Conducted classes and doubt sessions for a batch of 60 senior undergraduate students from all across the country. Built course quizzes and programming assignments in collaboration with other TAs.

Student: LxMLS 2021
11th Lisbon Machine Learning Summer School

FEATURED COURSEWORK

- ***Mathematics***:
  Advanced Linear Algebra (2nd Sem., DTU; *University Rank-1*)
  MIT RES-6-012: Introduction to Probability, MIT OCW
  Abstract Algebra, Group Theory, and Linear Algebra, IIT-KGP (NPTEL)
  Numerical and Engineering Optimization Methods (3rd Sem., DTU)
  Swarm and Evolutionary Optimization (7th Sem., DTU)
- ***Machine Learning***:
  IFT 6760A: Matrix and tensor factorization techniques for machine learning, University of Montreal
  MIT 18-065: Matrix Methods in Signal Processing, and Machine Learning, MIT OCW
  Probabilistic Graphical Models Specialization, Stanford University
  Bayesian Methods for Machine Learning, National Research University of Russia
- ***Natural Language Processing***:
  CS11-737: Multilingual NLP, CMU
  CS11-747: Neural Networks for NLP, CMU
  Natural Language Processing (6th Sem., DTU)