Jivat Neet **Kaur**

Research Fellow, Microsoft Research

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Education

Jul 2021 – Aug 2017 | **Birla Institute of Technology and Science (BITS) Pilani** — **Pilani, India**
Bachelor of Engineering in Computer Science — CGPA: 9.23/10.0
Graduated with *Distinction*

Experience

Present – Sep 2021 | **Microsoft Research** [🌐] — **Bangalore, India**
Pre-Doctoral Research Fellow | Advisors: Dr. Amit Sharma, Dr. Emre Kiciman
Working on causal representation learning to improve Out-of-Distribution Generalization. Also working on developing robust machine learning pipelines by accomplishing independently improvable models.

Aug 2021 – May 2021 | **Adobe | Media and Data Science Research (MDSR) Lab** — **Remote**
Research Intern | Advisors: Dr. Sumit Bhatia, Balaji Krishnamurthy
Worked on knowledge enhancement of language models to make reliable factual and commonsense reasoning aware predictions. Awarded **full-time position** position offer based on internship performance.

May 2021 – Dec 2020 | **Carnegie Mellon University | MultiComp Lab, Language Technologies Institute** [🌐] — **Remote**
Research Assistant (Bachelor Thesis) | Advisors: Prof. Louis-Philippe Morency, PhD student Paul Pu Liang
Worked on accelerating exploration of agents in the absence of dense rewards by improving intrinsic reward signals to be more structured and grounded in the environment.

May 2021 – Oct 2020 | **Universität Hamburg | Language Technology Lab** [🌐] — **Remote**
Research Intern | Advisors: Prof. Dr. Chris Biemann
Designed a Pointer Generator based SPARQL semantic parser using Knowledge Graph embeddings.

Jul 2020 – May 2020 | **Microsoft** — **Bangalore, India**
Software Engineering Intern
Implemented active monitoring for Outlook Calendar REST API operations to decrease the Mean Time to Detect (MTTD) failure. Received **return offer** based on project review and interview performance.

Publications and Patents

S=In Submission, C=Conference, W=Workshop, P=Patent

[W.3/S.1] **Modeling the Data-Generating Process is Necessary for Out-of-Distribution Generalization** [PDF| Talk]
Jivat Neet Kaur, Emre Kıcıman, Amit Sharma
Workshop on Spurious Correlations, Invariance, and Stability, ICML, Baltimore, Maryland **[Spotlight]** [**SCIS@ICML'22**]
Eleventh International Conference on Learning Representations (ICLR'23) (under review)

[C.4] **LM-CORE: Language Models with Contextually Relevant External Knowledge** [PDF | Talk]
Jivat Neet Kaur, Sumit Bhatia, Milan Aggarwal, Rachit Bansal, Balaji Krishnamurthy
2022 Conference of North American Chapter of the Association for Computational Linguistics [**Findings of NAACL'22**]

[C.3] **CoSe-Co: Text Conditioned Generative CommonSense Contextualizer** [PDF]
Rachit Bansal, Milan Aggarwal, Sumit Bhatia, Jivat Neet Kaur, Balaji Krishnamurthy
2022 Conference of North American Chapter of the Association for Computational Linguistics [**NAACL'22**]

[C.2] **Modern baselines for SPARQL Semantic Parsing** [PDF]
Debayan Banerjee, Jivat Neet Kaur*, Pranav Ajit Nair*, Ricardo Usbeck, Chris Biemann
The 45th International ACM SIGIR Conference on Research and Development in Information Retrieval [**SIGIR'22**]

[C.1] **Simulation and Selection of Detumbling Algorithms for a 3U CubeSat** [PDF]
Vishnu P Katkoori, Jivat Neet Kaur, Tushar Goyal
70th International Astronautical Congress, Washington, D.C. **[Oral]** [**IAC'19**]

[W.2] **Ask & Explore: Grounded Question Answering for Curiosity-driven exploration** [PDF | Talk]
Jivat Neet Kaur, Yiding Jiang, Paul Pu Liang
Workshop on Embodied Multimodal Learning, ICLR (Virtual) [**EML@ICLR'21**]

[W.1] **No Need to Know Everything! Efficiently Augmenting Language Models With External Knowledge** [PDF | Talk]
Jivat Neet Kaur, Sumit Bhatia, Milan Aggarwal, Rachit Bansal, Balaji Krishnamurthy
Workshop on Commonsense Reasoning and Knowledge Bases, AKBC (Virtual) [**CSKB@AKBC'21**]

[P.2] **Language Model with External Knowledge Base**
Jivat Neet Kaur, Sumit Bhatia, Milan Aggarwal, Rachit Bansal, Balaji Krishnamurthy
US Patent Application | Adobe Inc. Under Filing

[P.1] **Generating Commonsense Context for Text using Knowledge Graphs**
Rachit Bansal, Milan Aggarwal, Sumit Bhatia, Jivat Neet Kaur, Balaji Krishnamurthy
US Patent Application | Adobe Inc. Under Filing

Select Research Projects

Independently Improvable Models for Robust Machine Learning Pipelines Aug'22 - Present
Advisors: Dr. Amit Sharma, Dr. Emre Kiciman | Collaborators: Dr. Adith Swaminathan, Dr. Aditya Modi, Prof. Maggie Makar

- Working on machine learning pipeline robustness by developing independently improvable models i.e. improvements in one model do not worsen overall pipeline performance.
- Devising training procedures to accomplish independent loss terms for individual modules so that downstream model training is robust to input perturbations; thus leading to robust pipelines.

Causally Adaptive Constraint Minimization for Out-of-Distribution Generalization Sep'21 - Jul'22
Advisors: Dr. Amit Sharma, Dr. Emre Kiciman

- Proposed a causal framework for generalization under single- and multi-attribute distribution shifts. [**SCIS@ICML'22**]
- Theoretically proved that an algorithm using a fixed independence constraint cannot yield an optimal classifier on all datasets, explaining the inconsistent performance of Domain Generalization algorithms reported in past work.
- Proposed *Causally Adaptive Constraint Minimization (CACM)*, an algorithm that leverages knowledge about the data-generating process to identify and apply the correct independence constraints for regularization. [**In Submission**]
- Developed a new causal prediction API that is now open-sourced as part of DoWhy Python library. [**GitHub**]

Efficiently Augmenting Language Models with External Knowledge May'21 - Aug'21
Advisors: Dr. Sumit Bhatia, Milan Aggarwal, Balaji Krishnamurthy

- Worked on knowledge enhancement of language models (LMs) by augmenting structured knowledge externally.
- Created a new masked pre-training corpus using Wikipedia hyperlinks to identify entity spans; trained LMs to retrieve contextually relevant knowledge via masked language modeling on this modified corpus. [**CSKB@AKBC'21**]
- Obtained improved performance over pre-trained LMs measured by popular knowledge probes. Demonstrated robust predictions and reduced sensitivity to contextual variations by evaluation on harder data subsets. [**NAACL'22 Findings**]

Language Models for Curiosity-driven Exploration Dec'20 - May'21
Advisors: Prof. Louis-Philippe Morency, Yiding Jiang, Paul Pu Liang

- Worked on improving agent exploration in sparse reward environments by formulating structured intrinsic rewards.
- Devised a novel form of curiosity leveraging *grounded question answering* to encourage the agent to ask questions about the environment and be curious when the answers to these questions change.
- Demonstrated our reward to outperform recent exploration bonus formulations in sparse settings. [**EML@ICLR'21**]

Semantic Parsing using Knowledge Graph Embeddings Oct'20 - May'21
Advisor: Prof. Dr. Chris Biemann

- Worked on optimizing formal query generation for Knowledge Graph Question Answering (KGQA) by developing a knowledge-enhanced SPARQL semantic parser. Employed Pointer-Generator Network (PGN) to design the parser.
- Compared transformer-based semantic parsers (BART, T5) and PGNs on LC-QuAD 1.0 and LC-QuAD 2.0 datasets based on two different KGs (DBpedia, Wikidata), which resulted in interesting findings. Demonstrated gains achieved in PGNs by using KG embeddings for linked entities and relations. [**SIGIR'22**]

Select Software Projects

Compiler Design for a Custom Language Jan'20 - Apr'20
Advisor: Dr. Vandana Agarwal

- Developed a fully functional compiler from scratch (in C) capable of lexical analysis, syntax tree creation, semantic analysis, static and dynamic type checking and generating executable assembly code. [**code**]

COVINFO Application Jun'20 - Jul'20
IBM Crack the Covid-19 Crisis Hackathon

- Developed a web application for real-time hospital resource monitoring (beds, ICUs, ventilators). [**code**]

Honours and Awards

Spotlight at SCIS, ICML 2022 [🌐] 1 of 5 papers selected for oral spotlight presentation at ICML SCIS workshop.

Microsoft Global Hackathon, 2022 | Third Place Developed an Android application integrated with a Braille reader to enhance the digital exposure and improve Braille literacy of children in schools for the blind.

Prof. V S Rao Foundation Best All-Rounder Award 2021 For excellence in academic, leadership and sports activites.

Grace Hopper Celebration India (GHCI) Scholarship, 2020 [🌐] Awarded travel grant and scholarship to attend the GHCI conference.

Google Explore ML with Crowdsource, 2020 1 of 30 facilitators selected globally to train participants in ML skills.

International Conference on Small Satellites, 2019 | Third Position [🌐] Student Satellite Project Competition.

Bengalathon, 2019 | Finalist Devised solution for quick accident response to reach grand finals of a national hackathon.

Institute Merit Scholarship, 2018 Awarded by Dean, BITS Pilani to top 2% students for exceptional academic excellence.

Kishore Vaigyanik Protsahan Yojna (KVPY) Fellowship, 2016 Awarded to 2500 (top 2.5%) students out of 1 lakh+ applicants by Dept of Science and Technology, Govt. of India for scientific research aptitude.

Teaching Experience

Data Mining (CS F415) *Teaching and Lab Assistant* Aug'20 - Dec'20

› Conducted lab sessions and created learning resources in Python and IBM SPSS Modeler for the course.

Neural Networks and Fuzzy Logic (BITS F312) *Teaching Assistant* Jan'20 - May'20

› Designed coding assignments for over 150 students and took workshops on Python Deep Learning Frameworks such as Tensorflow and PyTorch. Also guided them in their research paper implementations; projects I mentored: [🔗] [🔗]

Academic Service

Reviewer	AAAI '23, FOMO-VL Workshop, ICDM'22
Facilitator	WiML Un-Workshop @ ICML 2021
Volunteer	NAACL'22, NeurIPS '21, EMNLP '21, ACL'21, ICML '21

Skills

Languages	Python, C, C++, Java, HTML, MATLAB
Libraries and Frameworks	Keras, scikit-learn, OpenCV, NLTK, Requests, PyTorch, Tensorflow
Tools	Git, Visual Studio, Elasticsearch
Relevant Coursework	Neural Networks and Fuzzy Logic, Data Mining, NLP and Vision with Deep Learning, Linear Algebra, Probability and Statistics, Calculus, Differential Equations, Data Structures and Algorithms, Object Oriented Programming, Image Processing, Number Theory

Leadership and Volunteering Roles

Causal ML and NLP Reading Group, MSR India *Founding Member* Oct'21 - Present

› Started a weekly reading group to discuss research in causal machine learning, NLP, and related areas.

Child Rights and You (CRY) [🌐] *Volunteer* Jan'21 - Present

› Actively involved in conducting online classes and awareness sessions for children from low-income backgrounds.

Scholarship Track [🌐] *India Chapter Head and Global Lead Ambassador* Jun'20 - Dec'21

› Led initiatives to make education and opportunities accessible by increasing awareness of scholarships and resources.

Team Anant (student satellite team) [🌐] *Executive Committee Member* Aug'19 - Jul'20

› Team Anant is developing BITS Pilani's first nanosatellite. Implemented the BDot law to control the high angular velocity of the satellite after deployment; also worked on code optimization for On-board Computer system of the satellite.

Election Commissioner, BITS Pilani Jan'19 - Jul'21

› Selected in the 3 member body out of 1000 students for conducting elections to the BITS Students' Union.

Basketball Team *Vice Captain* Aug'18 - Dec'18

› Led the Girls' Basketball Team for Bits Open Sports Meet'18 (BOSM) - annual sports fest of BITS Pilani.