Jivat Neet **Kaur**

Research Fellow, Microsoft Research

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Education

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

Experience

Present | **Microsoft Research** [🌐] | **Bangalore, India**
Sep 2021 | *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 robustness and modularization of machine learning pipelines to allow independent improvability of models.

Aug 2021 | **Adobe | Media and Data Science Research (MDSR) Lab** | **Remote**
May 2021 | *Research Intern | Advisor: 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 | **Carnegie Mellon University | MultiComp Lab, Language Technologies Institute** [🌐] | **Remote**
Dec 2020 | *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 | **Universität Hamburg | Language Technology Lab** [🌐] | **Remote**
Oct 2020 | *Research Intern | Advisors: Prof. Dr. Chris Biemann*
Designed a Pointer Generator based SPARQL semantic parser using Knowledge Graph embeddings.

Dec 2020 | **BITS Pilani | Web Intelligence and Social Computing Lab** [🌐] | **Pilani, India**
Aug 2020 | *Research Assistant | Advisor: Dr. Yashvardhan Sharma*
Developed a closed-domain Question Answering and frequently asked questions (FAQ) retrieval system for BITSAT university-wide examination.

Jul 2020 | **Microsoft** | **Bangalore, India**
May 2020 | *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.2/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**]
Workshop on Commonsense Reasoning and Knowledge Bases, AKBC (Virtual)

[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**]
Workshop on Commonsense Reasoning and Knowledge Bases, AKBC (Virtual)

[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.1] **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**]

[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

Causally Adaptive Constraint Minimization for Out-of-Distribution Generalization Sep'21 - Jun'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**]

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). Integrated a mask detection model to provide real-time information (stored in a NoSQL database on IBM Cloudant) regarding the percentage of people wearing masks at any location using live video feed. [**code**]

Honours and Awards

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

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 Network 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 underprivileged children.

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

› Lead 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. Designed 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.