

# Atharva Kulkarni

## Ph.D. in Computer Science | University of Southern California

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**Research Interests:** Robust, Generalizable, & Trustworthy NLP | Data-Centric Machine Learning

## Education

- Aug 2024	University of Southern California   Thomas Lord Dept. of Computer Science Ph.D. in Computer Science Advisor: Prof. Swabha Swayamdipta	Los Angeles, USA
May 2024 Aug 2022	Carnegie Mellon University   Language Technologies Institute M.S. in Language Technologies, QPA: 4.04/4.00 Advisors: Prof. Graham Neubig & Prof. Barnabás Póczos	Pittsburgh, PA
May 2020 Aug 2016	Savtribai Phule Pune University   PVG's College of Engineering and Technology Bachelor's of Engineering (B.E.) in Computer Science, CPGA: 9.2/10	Pune, India

## Research Experience

Aug 2024 May 2024	Apple Research   Siri Conversational Intelligence Machine Learning Research Intern   Advisors: Dr. Yuan Zhang & Dr. Hong Yu ➢ Evaluating evaluation metrics for hallucination in LLMs.	Seattle, WA
May 2023	Machine Learning Research Intern   Advisors: Shruti Bhargava & Dr. Hong Yu ➢ Synthetic conversational data generation using Large Lanugage Models. (EACL 2024)	
May 2024 Aug 2022	Carnegie Mellon University   Language Technologies Institute Research Assistant   Advisors: Prof. Graham Neubig & Prof. Barnabás Póczos ➢ Information-theoretic analysis of uncertainty quantification metrics in large language models. ➢ Constrained multi-task learning for improving worst-group generalization. (TMLR 2024) ➢ Factual error correction using modular LLMs and constrained decoding. (EMNLP 2023 Findings)	Pittsburgh, PA
July 2022 March 2021	IIIT-Delhi   Laboratory for Computational Social Systems (LCS2) 🌐 Predoctoral Researcher   Advisor: Prof. Tanmoy Chakraborty ➢ Hate speech detection under subpopulation and covariate shifts. (SIGKDD 2023) ➢ Semantic role labeling of multimodal memes using optimal transport. (EACL 2023) ➢ Claim span identification using structural constraints and domain-specific rationales. (EMNLP 2022) ➢ Sarcasm explanation generation in mult-imodal multi-party dialogues. (ACL 2022)	Delhi, India

## Selected Publications (\* denotes equal contribution)

- [10] **Still Not Quite There! Assessing Large Language Models for Comorbid Mental Health Diagnosis**  
Amey Hengle\*, Atharva Kulkarni\*, Shantanu Patankar, Rashmi Gupta  
[Under Review EMNLP 2024]
- [9] **Multitask Learning Can Improve Worst-Group Outcomes** [PDF | code]  
Atharva Kulkarni\*, Lucio Dery\*, Amrith Setlur, Aditi Raghunathan, Ameet Talwalkar, Graham Neubig  
Transactions of Machine Learning Research [TMLR'24]
- [8] **SynthDST: Synthetic Data is All You Need for Few-Shot Dialog State Tracking** [PDF | code]  
Atharva Kulkarni, Bo-Hsiang Tseng, Joel Moniz, Dhivya Piraviperumal, Hong Yu, Shruti Bhargava.  
Conference of the European Chapter of the Association for Computational Linguistics [EACL'24]
- [7] **Counting the Bugs in ChatGPT's Wugs: A Multilingual Investigation into the Morphological Capabilities of a Large Language Model** [PDF | code]  
Leonie Weissweiler, Valentin Hofmann, Anjali Kantharuban, Anna Cai, Ritam Dutt, Amey Hengle, Anubha Kabra, Atharva Kulkarni, Abhishek Vijayakumar, Haofei Yu, Hinrich Schuetze, Kemal Oflazer, David R Mortensen.  
Conference on Empirical Methods in Natural Language Processing [EMNLP'23]
- [6] **The Student Becomes the Master: Matching GPT3 on Scientific Factual Error Correction** [PDF | code]  
Dhananjay Ashok, Atharva Kulkarni, Hai Pham, Barnabás Póczos.  
Findings of the Association for Computational Linguistics [EMNLP'23 Findings]

- [5] **Revisiting Hate Speech Benchmarks: From Data Curation to System Deployment** [PDF | code]  
 Atharva Kulkarni\*, Sarah Masud\*, Vikram Goyal, Tanmoy Chakraborty  
 ACM SIGKDD Conference on Knowledge Discovery and Data Mining [KDD'23]
- [4] **[AI for Social Good Award] Learning & Reasoning Multifaceted Longitudinal Data for Poverty Estimates and Livelihood Capabilities of Lagged Regions in Rural India** [PDF]  
 Atharva Kulkarni, Raya Das, Ravi Srivastava, Tanmoy Chakraborty  
 International Joint Conference on Artificial Intelligence [IJCAI'23]
- [3] **Characterizing Entities in Harmful Memes: Who is Hero, Villain, Victim?** [PDF | code]  
 Shivam Sharma\*, Atharva Kulkarni\*, Tharun Suresh, Himanshi Mathur, Preslav Nakov, Md. Shad Akhtar, Tanmoy Chakraborty  
 Conference of the European Chapter of the Association for Computational Linguistics [EACL'23]
- [2] **Empowering the Fact-checkers! Automatic Identification of Claim Spans on Twitter** [PDF | code]  
 Megha Sundriyal\*, Atharva Kulkarni\*, Vaibhav Pulastya, Md. Shad Akhtar, Tanmoy Chakraborty  
 Conference on Empirical Methods in Natural Language Processing [EMNLP'22]
- [1] **When did you become so smart, oh wise one?! Sarcasm Explanation in Multi-modal Multi-party Dialogues** [PDF | code]  
 Shivani Kumar\*, Atharva Kulkarni\*, Md. Shad Akhtar, Tanmoy Chakraborty  
 Annual Meeting of the Association for Computational Linguistics [ACL'22]

## Academic Service

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<b>Conference Reviewer</b>	ARR'24, EMNLP'23, ACL'23, EMNLP'22, ICON'22
<b>Workshop Reviewer</b>	WiNLP'24, NeurIPS'23 SSLTheoryPractice, NeurIPS'23 R0-FoMo
<b>Workshop Organizer</b>	CONSTRAINT Workshop co-located with ACL'22
<b>Conference Volunteer</b>	EACL'24, EACL'23, ACL'22, ACL'21, EACL'21

## Other Research Projects

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### Revisiting Information Theory for Uncertainty Quantification in Text Generation Jan'24 - May'24

Course: 11-910 Directed Research | Advisor: Prof. Graham Neubig

- > Proposed a novel metric for uncertainty quantification in text generation: the Jensen-Shannon divergence with respect to the Zipfian distribution. This metric accounts for both the concentration of probability mass and the diversity of tokens in the generated text, offering a balanced measure of uncertainty. [🔗]

### On the Effectiveness of LoRA: Advantages, Pitfalls, and Misconceptions Aug'23 - Dec'23

Course: 11-910 Directed Research | Advisor: Prof. Emma Strubell

- > Conducted a large scale empirical analysis of LoRA on – 1) Quantifying its training instability 2) Generalizability of its representations 3) Flatness of the loss landscape 4) Sensitivity to Hyperparameters. [🔗]

### V-Usable Information based LLM Pruning Jan'23 - May'2023

Course: 11-830 Computational Ethics in NLP | Instructors: Prof. Emma Strubell & Prof. Maarten Sap

- > Designed a V-usable information based Iterative Magnitude Pruning (ITM) technique that takes into account example difficulty for LLM compression. The pruning method effectively mitigates bias, enhances worst-group robustness, and preserves top-line performance compared to naive ITM. [🔗]

### Continual Learning via Winning Sub-Network Selection Jan'23 - May'23

Course: 11-707 Advanced Deep Learning | Instructor: Prof. Ruslan Salakhutdinov

- > Proposed a Winning SubNetworks (WSN) based technique for worst-group generalization that identifies the most effective subnetworks for each sub-group while preserving previously chosen weights. Achieved competitive performance with group-DRO on CIFAR100. [🔗]

### Training Dynamics and Entropy-Aware Mixup for Robust Text Classification Aug'22 - Dec'22

Course: 11-711 Advanced NLP | Instructor: Prof. Graham Neubig

- > Developed a robust mixup technique that generates synthetic samples by interpolating pairs of high and low entropy datapoints of easy-to-learn and ambiguous examples in a label aware fashion. Reported an improvement of about 2% in f1-score on the 2 benchmarks datasets. [🔗]

## Honours and Awards

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1. **USC Viterbi Fellowship (2024-25)** – Awarded to selected incoming PhD student at USC, covering full tuition & stipend.
2. **CMU LTI Research Fellowship (2023-24)** – Awarded to selected MLT students at CMU, covering full tuition & stipend.
3. **Best AI for Social Good Project | IJCAI’23** [🔗] Awarded for proposing poverty estimation technique in Indian setting.
4. **Shared Task Winner | WASSA @ EACL’21** [🔗] Best system for empathy & distress detection in reaction to news stories.
5. **Shared Task Winner | TechDoFication @ ICON’20** [🔗] Best system for coarse-grained technical domain identification for documents in indigenous Indian languages.
6. **Bachelor’s Thesis Award | ZS ASPIRE 2020** [🔗] 2<sup>nd</sup> place amongst 33,000 teams and cash prize of 2,00,000 INR for project SmartCap – A deep learning based device for visually impaired people.

## Talks

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### “SynthDST: Synthetic Data is All You Need for Few-Shot Dialog State Tracking”

- EACL’24 Presentation March 2024 (Malta)
- Siri Conversational Intelligence, Apple Inc Aug 2024 (Seattle, WA)

### “When did you become so smart, oh wise one?! Sarcasm Explanation in Multi-modal Multi-party Dialogues”

- Student Research Symposium, CMU Aug 2022 (Pittsburgh, PA)

## Teaching and Leadership Roles

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**Advanced NLP (Graduate Course), CMU** *Teaching Assistant* Fall’23

- TA for 11711 - [Advanced NLP](#) at CMU, taught by [Prof. Daniel Fried](#).
- Designed assignments and guided teams for semester long course projects.

**Natural Language Processing (Graduate Course), CMU** *Teaching Assistant* Spring’23

- TA for 11611 - [Natural Language Processing](#) at CMU, taught by [Prof. David Mortensen](#).
- Designed assignments and guided teams for semester long course projects.

**AI Undergrad Mentorship Program, CMU** *Mentor* Fall’22

- Mentored undergraduate students at CMU for starting out with NLP research.

**Collaborative Open Research in Deep Learning (CORD.ai)** *Mentor* Fall’22

- CORD.ai is a community of research mentors from MIT, CMU, Georgia Tech, UBC, Samsung, Adobe, and Microsoft.
- Mentored students from underprivileged backgrounds on AI projects.

## References

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**Prof. Graham Neubig** Associate Professor, Carnegie Mellon University, USA [🔗]

**Prof. Barnabás Póczos** Associate Professor, Carnegie Mellon University, USA [🔗]

**Prof. Tanmoy Chakraborty** Associate Professor, IIT Delhi, India [🔗]