Dheeraj Mekala

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Google Scholar

Research Interests

I envision the future of AI as a proactive and collaborative tool for humans that is capable of utilizing external tools. I am currently interested in enabling the interplay between humans and large language models (LLMs) with minimal annotation and training costs.

Education

University of California, San Diego *2021 - present*
PhD in Computer Science
Advisor: Prof. Jingbo Shang

University of California, San Diego *2019 - 2021*
MS in Computer Science, Thesis Track
2021 UCSD CSE Master's Award for Excellence in Research.
Advisor: Prof. Jingbo Shang

Indian Institute of Technology Kanpur *2013 - 2017*
B.Tech in Computer Science and Engineering

Publications

Conference Publications

1. **ZEROTOP: Zero-Shot Task-Oriented Semantic Parsing using Large Language Models**
Dheeraj Mekala, Jason Wolfe, Subhro Roy
Conference on Empirical Methods in Natural Language Processing (EMNLP), 2023.

2. **SELFOOD: Self-Supervised Out-Of-Distribution Detection via Learning to Rank**
Dheeraj Mekala*, Adithya Samavedhi*, Chengyu Dong, Jingbo Shang
Findings of the Conference on Empirical Methods in Natural Language Processing (EMNLP), 2023.

3. **A Benchmark on Extremely Weakly Supervised Text Classification: Reconcile Seed Matching and Prompting Approaches**
Zihan Wang*, Tianle Wang*, **Dheeraj Mekala**, Jingbo Shang
Findings of the Association for Computational Linguistics (ACL), 2023

4. **Leveraging QA Datasets to Improve Generative Data Augmentation**
Dheeraj Mekala, Tu Vu, Timo Schick, Jingbo Shang
Conference on Empirical Methods in Natural Language Processing (EMNLP), 2022

5. **LOPS: Learning Order Inspired Pseudo-Label Selection for Weakly Supervised Text Classification**
Dheeraj Mekala, Chengyu Dong, Jingbo Shang
Findings of the Conference on Empirical Methods in Natural Language Processing (EMNLP), 2022

6. **Progressive Sentiment Analysis for Code-Switched Text Data**
Sudhanshu Ranjan, **Dheeraj Mekala**, Jingbo Shang
Findings of the Conference on Empirical Methods in Natural Language Processing (EMNLP), 2022

7. **Coarse2Fine: Fine-grained Text Classification on Coarsely-grained Annotated Data**
Dheeraj Mekala, Varun Gangal, Jingbo Shang
Conference on Empirical Methods in Natural Language Processing (EMNLP), 2021

8. **BFClass: A Backdoor-free Text Classification Framework**
Zichao Li*, **Dheeraj Mekala***, Chengyu Dong, Jingbo Shang
Findings of the Conference on Empirical Methods in Natural Language Processing (EMNLP), 2021

9. **XClass: Text Classification with Extremely Weak Supervision**.
Zihan Wang, **Dheeraj Mekala**, Jingbo Shang
Conference of the North American Chapter of the Association for Computational Linguistics (NAACL), 2021
(Virtual Talk).

10. **META: Metadata-Empowered Weak Supervision for Text Classification**.
Dheeraj Mekala, Xinyang Zhang, Jingbo Shang
Conference on Empirical Methods in Natural Language Processing (EMNLP), 2020 **(Virtual Talk)**.

11. **Contextualized Weak Supervision for Text Classification**.
Dheeraj Mekala, Jingbo Shang
Association for Computational Linguistics (ACL), 2020 **(Virtual Talk)**.

12. **User bias removal in review score prediction**.
Rahul Wadbude*, Vivek Gupta*, **Dheeraj Mekala**, Harish Karnick.
ACM India Joint International Conference on Data Science and Management of Data (CODS/COMAD) 2018.

13. **SCDV: Sparse Composite Document Vectors using soft clustering over distributional representations**.
Dheeraj Mekala*, Vivek Gupta*, Bhargavi Paranjape, Harish Karnick.
Conference on Empirical Methods in Natural Language Processing (EMNLP), 2017 **(Long Oral)**.

Preprints & Submissions

* - equal contribution

1. **TOOLVERIFIER: Generalization to New Tools via Self-Verification**
Dheeraj Mekala*, Jason Weston, Jack Lanchantin, Roberta Raileanu, Maria Lomeli, Jingbo Shang, Jane Yu
(under review), 2024.

2. **Smaller Language Models are capable of selecting Instruction-Tuning Training Data for Larger Language Models**
Dheeraj Mekala*, Alex Nguyen*, Jingbo Shang
(under review), 2024.

3. **MORL-Prompt: An Empirical Analysis of Multi-Objective Reinforcement Learning for Discrete Prompt Optimization**
Yasaman Jafari, **Dheeraj Mekala**, Rose Yu, Taylor Berg-Kirkpatrick
(under review), 2024.

4. **News Meets Microblog: A Retriever-Generator Hashtag Annotation Framework**
Xiuwen Zheng*, **Dheeraj Mekala***, Amarnath Gupta, Jingbo Shang
(under review), 2021.

5. **Bayes-optimal Hierarchical Classification over Asymmetric Tree-Distance Loss**
Dheeraj Mekala, Vivek Gupta, Purushottam Kar and Harish Karnick.
arXiv:1802.06771, 2018.

Theses

1. **Contextualized, Metadata-Empowered, Coarse-to-Fine Weakly-Supervised Text Classification**.
Dheeraj Mekala and Jingbo Shang.
Masters Thesis, Computer Science and Engineering, UC San Diego, 2019 - 21.

Work Experience

Meta AI Research *June 2023 - Sept 2023*
Research Scientist Intern, FAIR Team
Collaborators: Jason Weston, Jack Lanchantin, Maria Lomeli, Roberta Raileanu, Jane Yu
- Worked on training large language models to use tools, focusing on OOD generalization to unseen tools.
- Preparing a submission to ACL'24.

Microsoft Research Semantic Machines *June 2022 - Sept 2022*
Research Intern, Semantic Machines
Collaborators: Dr. Jason Wolfe, Dr. Subhro Roy
- Decomposed zero-shot semantic parsing task into multiple abstractive and extractive QA problems.
- Designed a QA model that abstains from prediction when it is not confident.
- Our QA-based formulation outperforms existing zero-shot methods significantly.

Amazon Science *June 2021 - Sept 2021*
Applied Scientist Intern, Product Graph Team
Collaborators: Dr. Nasser Zalmout
- Designed a hybrid architecture for Open-world, closed-world and long tail Attribute Value extraction.

- The hybrid architecture consists of a tagger to handle open-world values and a classifier to handle implicit values.
- This hybrid architecture resulted in a significant improvement in recall.

Sprinklr India Pvt. Ltd. *Apr 2018 - Jul 2019*
Data Scientist, Machine Learning Team
- Architected and built Sprinklr AI's visual insights module, being used by over 1200 Sprinklr clients.
- Developed in-house computer vision models for visual sentiment, gender, age, and inappropriate content detection.
- Built a scalable system capable of running models over 500 million messages per day using Kafka and Elasticsearch.
- Developed a dockerized auto-scaling framework which is deployed in kubernetes for image classification.

Sprinklr India Pvt. Ltd. *Jul 2017 - Apr 2018*
Product Engineer, Paid Advertising Team
- Developed a centralized monitoring environment which gathers system metrics as well as docker run-time metrics.
- Developed an end-to-end pipeline that incorporated DoubleClick tracking in ads.
- Implemented core functionalities to improve the feature of importing, exporting ads.

Microsoft India *May 2016 - Jul 2016*
Machine Learning Intern
- Built case routing system in Microsoft Dynamics CRM, which predicts the ideal assignment candidate for a case.
- Built a robust pipeline which connects Microsoft Dynamics CRM and Azure Machine Learning studio.

ASnTech & Engineering Services *Dec 2015 - Jan 2015*
Software Engineering Intern
- Designed an algorithm to speed up search queries related to the location of the vehicle, from 120 sec to 5 sec.
- Designed an algorithm that dynamically analyses accelerometer data of a moving vehicle to identify outliers and driving style of the driver.

Pet Projects

DocMaster *June 2022 - Sept 2023*
- Developed a privacy-preserving document-analyzing assistant for the International Student Organization (ISPO).
- End-to-end document annotation, model training, and model inference are built from scratch and locally hosted to ensure privacy.
- Reduced the document processing time for work permit approval from 1 day to 1 hour.

Selected Awards and Honors

- UCSD CSE Student Achievement Award for Excellence in Research. *2021*
- Best Project Award in Graduate-level Statistical Natural language processing course. *2019*
- Ranked in Top 0.5% in JEE Advanced (IIT-JEE) 2013 among 150,000 candidates *2013*
- Ranked in Top 0.2% in JeeMains-BTech 2013 among 1,400,000 candidates *2013*
- Bronze Medal and Certificate of Merit (Top 15 in India) for National Science Olympiad '13 *2013*
- Awarded KVPY Fellowship from Government of India. *2012*

Talks

- Panelist *Technical Limitations of ChatGPT: Present and Future* at San Diego SuperComputer Center.
- Interview on ETV (A Leading Indian news and entertainment cable television network) *September 2021*
- Guest lecture, Introduction to Data Mining - *Prof. Jingbo Shang* *March 2021*
- University of Utah Data Science Seminar *September 2020*

Professional Responsibilities

- *Area Chair:* ACL 2024
- *Peer Reviews:* ARR{2021-present}, AAAI{2021,23,24}, NAACL{2021,22,24}, ACL{2021,22,23}, EMNLP{2021,22,23}
- *Graduate Teaching Assistantship* - Dept. of Computer Science and Engineering, UCSD

  - Introduction to Machine Learning - *Prof. Jingbo Shang* *Spring'{21,23}*
  - Introduction to Data Mining - *Prof. Jingbo Shang* *Spring'20, Winter'{21,22,23}*
  - Advanced Data-Driven Text Mining - *Prof. Jingbo Shang* *Fall 2020*
  - TA Lead on Remote Teaching *Summer 2020*
  - Mathematics for Algorithms and Systems Analysis - *Prof. Oliver Braun* *Summer 2020*
  - Introduction to Programming in Java - *Prof. Adalbert Gerald Soosai Raj* *Winter 2020*
- *Mentorship*
  - Students
    * Adithya Samavedhi [C.2]
      MS student, UCSD CSE *2022 -*
    * Alex Nguyen
      BS student, UCSD CSE *2022 -*
    * Bryant Tan
      BS student, UCSD CSE *2022 -*
    * Gilen Wu-Hou
      BS student, UCSD CSE *2022 -*
    * Jinya Jiang
      BS student, UCSD CSE *2022 -*
    * Sudhanshu Ranjan [C.6]
      MS student, UCSD CSE → Software Engineer, Health at Scale *2021*
- *Regional Academic Mentor* - Dept. of Computer Science and Engineering, IIT Kanpur *2014 - 2015*
- *Student Guide* - IIT Kanpur *2014 - 2015*