Dhruv Kumar

(+1) 226-9783751 • ddhruvkr@gmail.com • Github • Website • LinkedIn

EDUCATION

University of Waterloo, Ontario, Canada — Sep 2018- Jul 2020
M. Math.(Thesis) in Computer Science — GPA: 86.75/100 (3.88/4)
Thesis: Iterative Edit-based Unsupervised Sentence Simplification
Coursework: Deep Learning, Trust Modeling and Online Social Networks, Blockchains: Foundations and Applications, Privacy and Fairness in Data Science

Indian Institute of Information Technology, Allahabad, U.P., India — Jul 2012- Jun 2016
B. Tech.(Hons) in Information Technology — GPA: 8.68 / 10.00 (9.07 - Last 2 years)
Thesis: Compressed Knowledge transfer via Factorization Models in Recommender Systems
Relevant Coursework: Information Retrieval, Artificial Intelligence, Natural Language Processing, Cognitive Process Modelling, Optimization Techniques, Data Mining, Probability & Statistics, Mathematics(I, II, III).

PUBLICATIONS

- S. Gehrmann et al., "The GEM Benchmark: Natural Language Generation, its Evaluation and Metrics", *ArXiv 2021*
- O. Vechtomova, G. Sahu, **D. Kumar**, "Generation of lyrics lines conditioned on music audio clips", *In Workshop on NLP for Music and Audio (NLP4MusA) at ISMIR 2020*
- **D. Kumar**, L. Mou, L. Golab, O. Vechtomova, "Iterative Edit-based Unsupervised Sentence Simplification", *In Proceedings of ACL 2020 - Long Paper*
- R. Cohen, R. Agarwal, **D. Kumar**, A. Parmentier, T. H. Leung, "Sensitivity to risk profiles of users when developing AI systems", *33rd Canadian Conference on Artificial Intelligence (Canadian AI 2020)*
- R. Agarwal* , **D. Kumar***, L. Golab, S. Keshav, "Consentio: Managing Consent to Data Access using Permissioned Blockchains", *IEEE International Conference on Blockchain and Cryptocurrency (ICBC) 2020*
- **D. Kumar**, R. Cohen, L. Golab, "Online abuse detection: the value of preprocessing and neural attention models", in *10th workshop on Computational Approaches to Subjectivity, Sentiment & Social Media Analysis (WASSA) at NAACL-HLT 2019*
- N. Kushwaha, S. Mehrotra, R. Kalia, **D. Kumar**, O. P. Vyas, "Inclusion of Semantic and Time-Variant Information Using Matrix Factorization Approach for Implicit Rating of Last.Fm Dataset," in *Springer Arabian Journal of Science and Engineering*, May 2016.

RESEARCH EXPERIENCE

GEM Benchmark — Sep 2020-Present

- Working with Prof. Wei Xu, Sebastian Gehrmann, Mounica Maddela, Prof. Ondrej Dusek and many others on the GEM benchmark for natural language generation, evaluation, and metrics, to be held as a workshop at ACL 2021.

Borealis AI, Toronto, Canada,
Machine Learning Research Intern — Sep 2020-Jan 2021

- Worked on neural semantic parsing models for text-to-SQL. More specifically, explored explicit schema linking and regularization techniques like adversarial domain adaptation, schema dropout and ensemble distillation to improve cross-domain generalizability and performance of a state-of-the-art semantic parser on the Spider dataset.
- Showed the efficacy of data-dependent initialization for transformers in improving generalization and for training deeper models on small datasets requiring structural understanding and logical reasoning.
- **The paper is under review.**

[Supervisor: *Dr. Yanshuai Cao*]

University of Waterloo, Waterloo, Canada

- *Unsupervised sentence simplification* — Jul 2019-Jul 2020

Designed an unsupervised algorithm building on edit-based text generation techniques for sentence simplification. The model is highly adaptable and can achieve SARI and BLEU scores of **30.44** and **26.47** respectively on the Newsela dataset.
[Supervisors: *Prof. Lili Mou, Prof. Lukasz Golab, Prof. Olga Vechtomova*]

- *Music audio conditioned lyrics generation* Sep 2019-Apr 2020

Designed bimodal neural network models based on variational autonencoders (VAEs) to generate lines of lyrics for instrumental piece of music.
[Supervisor: *Prof. Olga Vechtomova*]

- *Anonymize personal attributes in human generated text* Oct 2019-Dec 2019

As part of the course "Privacy and Fairness in Data Science", worked with the PASTEL and Yelp datasets to build an unsupervised neural model for multi-attribute style transfer. The model uses a combination of denoising, cycle consistency and classification losses.
[Supervisor: *Prof. Xi He*]

- *Consent Management System* Jan 2019-Aug 2019

Designed Consentio, a permissioned blockchain-based consent management system (CMS) that can handle up to **6000** transactions per second.
[Supervisors: *Prof. Lukasz Golab*, *Prof. Srinivasan Keshav*]

- *Online abuse detection in Social Networks* Oct 2018-Feb 2019

Proposed a co-attention based neural model to detect implicit aggressiveness and incivility in online social networks. The model achieves a F1 score of **82.41**, **77.75** and **76.07** for the minority abuse class on the Wikipedia toxicity/attack/aggression datasets respectively.
[Supervisors: *Prof. Robin Cohen*, *Prof. Lukasz Golab*]

- *Attention-based Text classification* Dec 2018-Jan 2019

Implemented various state of the art deep learning models (e.g. Co-attention, Self-attention, Hierarchical attention) for text classification. The models were inspired by research conducted for different tasks in NLP.

- *Span-based Question Answering* Oct 2018-Dec 2018

As part of the "Deep Learning" course, implemented the Bi-Directional Attention Flow (BiDAF) model from scratch over the SQuAD1.1 dataset.
[Supervisors: *Prof. Ali Ghodsi*]

Universität Paderborn, Paderborn, Germany Jan 2016-Jun 2016

- Bachelor's Thesis: "Compressed Knowledge transfer via Factorization Models in Recommender Systems". Developed an algorithm to incorporate metadata in Factorization Machines, achieving the RMSE value of **0.836** as compared to **0.853** when using a Joint Matrix Factorization method on the MovieLens 1M dataset. [Supervisors: Dr. Artus Krohn-Grimberghe, Prof. Ratna Sanyal]

Indian Institute of Information Technology, Allahabad, India Jul 2015-Dec 2015

- "Analysis of Time-Aware and Semantic Feature Based Music Recommender System". Proposed a Joint Matrix Factorization algorithm for Music Recommendation that utilizes geographical and time-based tagging information of artists, in addition to implicit user feedback (user clicks) to provide better recommendations. [Supervisor: Dr. O.P.Vyas]

TEACHING ASSISTANT EXPERIENCE

- CS 115: Introduction to Computer Science, Fall 18, University of Waterloo.
- CS 230: Introduction to Computers and Computer Systems, Winter 19, Spring 20, University of Waterloo.
- CS 231: Algorithmic Problem Solving, Spring 19, University of Waterloo.
- CS 241: Foundations of Sequential Programs, Fall 19, University of Waterloo.
- CS 489/698: Topics in Computer Science, Neural Networks, Winter 20, University of Waterloo.

SERVICE

- **Program Committee / Reviewer:** NeurIPS2019 AISG (AI for Social Good) Workshop
- **Program Committee / Organizer:** GEM: Natural Language Generation, Evaluation, and Metrics- ACL 2021

OTHER EXPERIENCE

Arcesium(DE Shaw Group), Hyderabad, India Jul 2016-May 2018

Software Engineer, Fund and Investor Accounting

- Enhanced the post-trade automation platform for funds operated by J.P. Morgan and D.E. Shaw.

Citigroup, Pune, India

Software Engineering Intern, Equities May 2015-Jul 2015

- Designed the first prototype of the Trading Controls application. Declined the full-time offer.

SKILLS

Python, Pytorch, Java, C/C++, SQL, Flask

ACHIEVEMENTS & EXTRA-CURRICULAR

- Received International Masters Student Award and University of Waterloo Entrance Scholarship for graduate studies.
- Got Graduate Studies Research Travel Assistantship to attend the NAACL-HLT Conference, 2019.
- Accepted in the *Deep and Reinforcement Learning Summer School*, 2019 (less than 25% acceptance rate).
- Stood in the top 0.5% in the All India Engineering Entrance Examination 2012.
- Worked as the Events Head of the annual cultural cum technical festival *Effervescence* 2014.
- Represented the college band as a drummer.