Dhruv Kumar

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EDUCATION

University of Waterloo, School of Computer Science, Waterloo, Canada **Sep 2018 - Aug 2020**
Master of Mathematics (Thesis), Computer Science **GPA: 86.75/100 (3.88/4)**
Thesis: Iterative Edit-based Unsupervised Sentence Simplification

Indian Institute of Information Technology, Allahabad, India **Jul 2012 - Jun 2016**
Bachelor of Technology (Hons.), Information Technology **GPA – 8.68/10 (9.07 - Last 2 years)**
Thesis: Compressed Knowledge transfer via Factorization Models in Recommender Systems

SKILLS

- **Relevant Coursework (Graduate and Undergraduate)**: Deep Learning, Trust Modeling and Online Social Networks, Privacy and Fairness in Data Science, Information Retrieval, Artificial Intelligence, Natural Language Processing, Cognitive Process Modelling, Optimization Techniques, Data Mining, Probability & Statistics, Mathematics(I, II, III).
- **Languages and Frameworks**: Python, Pytorch, Keras, Java, SQL, C/C++
- **Interests**: Natural Language Processing, Machine Learning

SELECTED PUBLICATIONS

- O. Vechtomova, G. Sahu, **D. Kumar**, Real-time lyrics generation for instrumental music (Name changed), Under review.
- P. Xu, **D. Kumar**, W. Yang, W. Zi, K. Tang, C. Huang, J.C.K. Cheung, S.J.D. Prince, Y. Cao, Optimizing Deeper Transformers on Small Datasets: An Application on Text-to-SQL Semantic Parsing (Name changed), Under review.
- 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 the 58th annual meeting of the Association for Computational Linguistics (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, In 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 - Full Paper
- **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 at NAACL-HLT 2019

INDUSTRY EXPERIENCE

Borealis AI, Toronto, Canada
Machine Learning Research Intern, Alan Research **Sep 2020 - Dec 2021**

- Worked on explicit schema linking and regularization techniques 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. **The paper is under review at a conference.**

Arcesium (DE Shaw Group), Hyderabad, India
Software Engineer, Fund and Investor Accounting **Jul 2016 - May 2018**

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

ACADEMIC 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.

University of Waterloo, Waterloo, Canada

Music audio conditioned lyrics generation **Sep 2019 - Present**

- Designed bimodal neural network models based on variational autoencoders(VAEs) to generate lines of lyrics for instrumental pieces of music.
- Extended the above approach to align the learned latent spaces of audio and text representations using generative adversarial networks (GAN) and conditional variational autoencoders (CVAE). **Paper is under review at a conference.**

Iterative Edit-based Unsupervised Sentence Simplification **Jul 2019 - June 2020**

- Designed an unsupervised algorithm building on edit-based text generation techniques for sentence simplification. The model is more controllable and interpretable and achieves SARI scores comparable to supervised models.

Unsupervised neural models to anonymize personal attributes in text **Oct 2019 - Dec 2019**

- Human written text contains implicit linguistic information that can be used to identify our attributes such as gender, age and political leanings. Built an unsupervised neural model for multi-attribute style transfer that uses a combination of denoising, cycle consistency and classification losses.

Consentio: Managing Consent to Data Access using Permissioned Blockchains **Jan 2019 - Aug 2019**

- Designed a consent management system based on permissioned blockchains that can handle up to 6000 transactions per second.

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

- Implemented various 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.

Detecting Incivility in online social networks **Oct 2018 - Feb 2019**

- Proposed a co-attention-based neural model for online abuse detection. The model achieves F1 scores of 82.41, 77.75 and 76.07 for the minority abuse class on the Wikipedia toxicity/attack/aggression datasets respectively.

Universität Paderborn, Paderborn, Germany

Compressed Knowledge transfer via Factorization Models in Recommender Systems **Jan 2016 - Jun 2016**

- Developed an algorithm to incorporate metadata in Factorization Machines, lowering RMSE value to 0.836 as compared to 0.853 when using a Joint Matrix Factorization method on the MovieLens 1M dataset.

Indian Institute of Information Technology, Allahabad, India

Analysis of Time-Aware and Semantic Feature-Based Music Recommender System **Jul 2015 - Dec 2015**

- 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).

SERVICE

- Program Committee / Reviewer: NeurIPS 2019 AISG (AI for Social Good) Workshop
- Program Committee / Organizer: GEM: Natural Language Generation, Evaluation, and Metrics- ACL 2021

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.

ACHIEVEMENTS & EXTRA-CURRICULARS

- 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 Learning and Reinforcement Learning Summer School, 2019 (less than 25% acceptance rate).
- Served as the Events Head of the annual cultural cum technical festival - Effervescence 2014.
- Represented the college band as a drummer.
- Stood in the top 0.5% in the All India Engineering Entrance Examination 2012.