

# Rishabh Bhardwaj

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## Research Interest

- My main focus is to make NLP models more robust. For instance, I have worked on analysis and debiasing algorithms for gender biases in BERT where we found directions in the embedding space that encode gender information. Another work comes from the interpretability of Transformer where we theoretically analyse if the self-attention is identifiable and propose identifiable transformers (accepted at ACL 2021). My under review submission to a reputed conference includes Optimal Transport (OT) based algorithms that confidently distill unbiased knowledge from an intelligent system to another. I was fortunate to work at Salesforce as NLP research intern where I worked on parameter-efficient prompt-tuning. I am currently visiting California, working as an Applied Scientist Intern at Amazon, California, USA.

## Education

- 2020 – **Ph.D. in Natural Language Processing**, Singapore University of Technology and Design, Singapore.  
*CGPA: 5.1/5.0*
- 2014 – 2018 **B.E. (Hons) Electrical and Electronics**, Birla Institute of Technology and Science Pilani, India.  
*CGPA: 8.95/10*
- 2012 – 2013 **CBSE Higher Secondary Education**, SSAV, Agra, India.  
*Percentage: 85.8*
- 2010 – 2011 **CBSE Secondary Education**, KV Bharatpur, India.  
*CGPA: 10/10*

## Employment History

- June 2022 – Sept 2022 **Applied Scientist Intern** Natural Language Processing at *Amazon, California, USA.*
- Jan 2022 – April 2022 **Research Intern** Natural Language Processing at *Salesforce Research Singapore* (submitted to EMNLP 2022).
- April 2019 – Jan 2020 **Research Assistant** under Dr. Prateek Saxena, Associate Professor, Department of Computer Science, *National University of Singapore.*
- Jan 2018 – Mar 2019 **Visiting Researcher** under Dr. Lu Wei, Associate Professor, ISTD Pillar, *Singapore University of Technology and Design.*
- May 2017 – Aug 2017 **Research Intern** under Dr. Manisha Gupta, Assistant Professor, Electrical and Computer Engineering, *University of Alberta, Canada.*
- May 2016 – May 2017 **Research Intern** under Dr. Soumendu Sinha, Scientist, *Central Electronics Engineering Research Institute, Pilani, India.*

## Research Publications

### Conference Proceedings

- 1 Bhardwaj, R., Saha, A. & Hoi, S. C. (2022). Vector-quantized input-contextualized soft prompts for natural language understanding (under review at **EMNLP 2022**)  
<https://arxiv.org/abs/2205.11024>.
- 2 Bhardwaj, R., Vaidya, T. & Poria, S. (2022). Federated distillation of natural language understanding with confident sinkhorns (under review at **COLING 2022**)  
<https://arxiv.org/abs/2110.02432>.
- 3 Bhardwaj, R., Majumder, N., Poria, S. & Hovy, E. (2021). More identifiable yet equally performant transformers for text classification (**ACL 2021**)  
<https://github.com/declare-lab/identifiable-transformers>.
- 4 Pan\*, J., Bhardwaj\*, R., Wei, L., Chieu, H. L., Pan, X. & Puay, N. y. (2019). Twitter homophily: Network based prediction of user's occupation (**ACL 2019**)  
<https://www.aclweb.org/anthology/P19-1252/>.

### Journals

- 1 Bhardwaj, R., Majumder, N. & Poria, S. (2021). Investigating gender bias in bert. *Cognitive Computation*,  
<https://arxiv.org/abs/2009.05021>.
- 2 Poria, S., Majumder, N., Hazarika, D., Ghosal, D., Bhardwaj, R., Jian, S. Y. B., ..., Chhaya, N. et al. (2021). Recognizing emotion cause in conversations. *Cognitive Computation*, 13(5),  
<https://arxiv.org/abs/2012.11820>.
- 3 Majumder\*, N., Bhardwaj\*, R., Poria, S., Zadeh, A., Gelbukh, A., Hussain, A. & Morency, L.-P. (2020). Improving aspect-level sentiment analysis with aspect extraction. *Neural Computing and Applications*  
<https://arxiv.org/abs/2005.06607>.

(In total, I have more than 10 published research papers and 2 research articles are under review. Please find more about my past works at: [google scholar](#))

## Reviewer & Supervision

- **Reviewer** of top-tier NLP conferences such as EMNLP 2022, ACL 2022, ACL 2021, NAACL 2021, ACL 2020 and Journals such as Information Fusion (impact factor 13.7) and Neural Computing and Applications (impact factor 4.774).
- **Teaching Assistant** I have been teaching assistant of two undergraduate level courses— Theory & Practice of Deep Learning and Information Retrieval (IR).
- **Supervisor** I have been an official supervisor of two outstanding undergrad students Mridula Ratheesh Thekkedath and Phang Teng Fone working on Complex Question Answering.

## Skills

Coding    ■ Python, Matlab, C, Java,  $\LaTeX$ .  
Machine Learning    ■ PyTorch, Tensorflow, Keras, Pandas, Numpy, SciPy, NLTK.

## Awards

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- **Kaggle (Sentiment Analysis)** 2<sup>nd</sup> rank in Shopee Sentiment Analysis Challenge.  
Link: <https://www.kaggle.com/c/shopee-sentiment-analysis/leaderboard>
- **Kaggle (Product Detection)** 2<sup>nd</sup> rank in Shopee Product Detection Challenge.  
Link: <https://www.kaggle.com/c/shopee-product-detection-open/leaderboard>  
*(Both the Kaggle competitions were hosted amongst 6 countries)*
- **MITACS Globalink** research internship award for research at University of Alberta, Edmonton, Canada (2017).