

Chaitanya K. Joshi

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Education

- 2015–2019 **Nanyang Technological University**, Singapore.
B.Eng. in Computer Science; Specialization in Artificial Intelligence.
GPA: 4.73/5.00; Valedictorian 2018-19; Dean's List 2015-16, 2018-19.
- 2017 **École Polytechnique Fédérale de Lausanne**, Switzerland.
Exchange Program, Computer Science; GPA: 5.40/6.00 (graduate-level coursework).

Awards

- 2019 **Valedictorian**, SCSE, NTU, Singapore.
Awarded by the School of Computer Science and Engineering for excellent academic performance, leadership qualities and public-speaking skills among the graduating cohort.
- 2019 **Final Year Thesis Gold Medal**, SCSE, NTU, Singapore.
For the best Final Year Project during the Academic Year 2018-19. Thesis: 'Graph ConvNets for the Travelling Salesman Problem', supervised by Prof. Xavier Bresson.
- 2018 **Best Professional Internship Award**, SCSE, NTU, Singapore.
For the best performance during Professional Internship (at SAP Leonardo) for AY 2017-18.

Experience

- 2020– **Institute for Infocomm Research, A*STAR**, Singapore, *Research Engineer*.
- Working on Graph Neural Networks in scientific discovery applications with Dr. Chuan-Sheng Foo and Dr. Lin Jie.
- 2019–2020 **Graph Deep Learning Lab, NTU**, Singapore, *Research Assistant*.
- Worked on benchmarking Graph Neural Network architectures and their application to combinatorial optimization problems with Prof. Xavier Bresson.
 - Presented an invited talk at the INFORMS Annual Meeting 2019 session on 'Boosting Combinatorial Optimization using Machine Learning' and a poster at NeurIPS 2019 workshop.
 - Co-authored 5 papers, open-sourced code with 1,500+ stars on GitHub.
- 2018 **SAP Leonardo**, Singapore, *Machine Learning Engineer Intern*.
- Built and deployed deep learning systems for matching financial data to automate corporate accounting processes. Part of *Cash Application*, SAP's flagship ML product handling over €200 Million in annual sales pipeline for global companies.
 - Designed deep embedding models for structured data combined with graph combinatorial optimization to improve system accuracy by 8% and reduce computation time by 99%.
 - Co-authored 3 US patents (pending).
- 2017 **Artificial Intelligence Lab, EPFL**, Switzerland, *Research Intern*.
- Worked on Memory Networks for personalization in dialog systems with Prof. Boi Faltings. First-authored paper at NeurIPS 2017 workshop, with 100+ stars on GitHub.
- 2017 **Evie.ai**, Singapore, *Machine Learning Engineer Intern*.
- Built and deployed deep learning-based NLP pipelines for a conversational AI scheduling assistant.
- 2016 **SenticNet, NTU**, Singapore, *Research Intern*.
- Worked on Recurrent Neural Networks for contextual word embeddings with Prof. Erik Cambria.

Publications

- [1] Peng Xu, Chaitanya K Joshi, and Xavier Bresson. **Multi-Graph Transformer for Free-Hand Sketch Recognition**. *IEEE Transactions of Neural Networks and Learning Systems (TNNLS)*, 2021. PDF: arxiv.org/pdf/1912.11258.pdf.
- [2] Chaitanya K Joshi, Quentin Cappart, Louis-Martin Rousseau, Thomas Laurent, and Xavier Bresson. **Learning TSP Requires Rethinking Generalization**. *ArXiv preprint, under review*, 2020. PDF: arxiv.org/pdf/2006.07054.pdf.
- [3] Vijay Prakash Dwivedi*, Chaitanya K Joshi*, Thomas Laurent, Yoshua Bengio, and Xavier Bresson. **Benchmarking Graph Neural Networks**. *ArXiv preprint, under review*, 2020. *Equal contribution. PDF: arxiv.org/pdf/2003.00982v2.pdf.
- [4] Chaitanya K Joshi, Thomas Laurent, and Xavier Bresson. **On Learning Paradigms for the Travelling Salesman Problem**. In *NeurIPS Workshop on Graph Representation Learning*, 2019. PDF: arxiv.org/pdf/1910.07210.pdf.
- [5] Chaitanya K Joshi, Thomas Laurent, and Xavier Bresson. **An Efficient Graph ConvNet Technique for the Travelling Salesman Problem**. *INFORMS Annual Meeting*, 2019. PDF: arxiv.org/pdf/1906.01227.
- [6] Kuhu Joshi and Chaitanya K Joshi. **Working women and caste in India: A study of social disadvantage using feature attribution**. In *ICLR Workshop on AI for Social Good*, 2019. PDF: arxiv.org/abs/1905.03092.
- [7] Chaitanya K Joshi. **Question-answering and Chatbots using Memory Networks**. In R Arumugam and R Shanmugamani, editors, *Hands-On NLP with Python*, chapter 9, pages 175–199. Packt Publishers, 2018.
- [8] Chaitanya K Joshi, Fei Mi, and Boi Faltings. **Personalization in Goal-oriented Dialog**. In *NeurIPS Workshop on Conversational AI*, 2017. PDF: arxiv.org/abs/1706.07503.

Patents

- [1] Sean Saito, Truc Viet Le, Chaitanya K Joshi, and Raja Shanmugamani. **Representing Sets of Entities for Matching Problems**. US Patent App. 16/208,681.
- [2] Sean Saito, Chaitanya K Joshi, Raja Shanmugamani, Truc Viet Le, and Rajesh Arumugam. **Utilizing Embeddings for Efficient Matching of Entities**. US Patent App. 16/217,148.
- [3] Truc Viet Le, Sean Saito, Chaitanya K Joshi, and Raja Shanmugamani. **Graphical Approach to Multi-Matching**. US Patent App. 16/210,070.

Selected Technical Writing

- [1] Chaitanya K Joshi. **Transformers are Graph Neural Networks**, September 2020. In *The Gradient* magazine. URL: thegradient.pub/transformers-are-graph-neural-networks/.
- [2] Chaitanya K Joshi. **Neural Combinatorial Optimization**, September 2019. In *Graph Deep Learning Lab* Blog. URL: graphdeeplearning.github.io/project/combinatorial-optimization/.
- [3] Chaitanya K Joshi. **Spatial Graph Neural Networks**, September 2019. In *Graph Deep Learning Lab* Blog. URL: graphdeeplearning.github.io/project/spatial-convnets/.

Invited Talks

- June 2021 **Learning TSP Requires Rethinking Generalization**, Canadian Operations Research Society (CORS) Conference 2021, Toronto, Canada.
- Sept 2020 **Benchmarking Graph Neural Networks**, Defense Science Organization (DSO) National Laboratories, Singapore.
- Oct 2019 **Graph ConvNets for the Travelling Salesman Problem**, INFORMS Annual Meeting 2019 Session: *Boosting Combinatorial Optimization using Machine Learning*, Seattle, USA.

Community Activities

- 2015–2018 **IEEE Student Chapter**, NTU, Singapore, *Vice President*.
- Organizer of NTU's premier annual hackathon series (*iNTUition*) with IEEE Singapore.
 - As Vice President, led teams of 15+ students, managed 250+ participants, and secured sponsorship of S\$ 10,000+ from companies such as Google, Microsoft and PayPal.
- 2016–2018 **NTU Open Source Society**, NTU, Singapore, *Vice President*.
- Presenter and organizer at 40+ free weekly programming and technology workshops (*TGIFHacks*) for NTU's largest student-run developer community.

Technical Skills

Programming Python, Matlab, Java
Data Science PyTorch, TensorFlow, Keras, Pandas, Scikit-learn, Data visualization
Development HTML5+CSS3, Django, Flask, Firebase, MySQL, Git

Miscellaneous

Service Reviewer for NeurIPS 2021, ICML 2020 workshop, AAI 2021 workshop, Distill Research Journal.

Nationality Indian

Languages English, Hindi, French

Hobbies Yoga, Soccer/Football, Hiking