FAHIM DALVI

Software Engineer | Deep Learning Researcher

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EDUCATION

Stanford University

Masters of Science in Computer Science

Artificial Intelligence and Machine Learning

2016 GPA: 4.0

Carnegie Mellon University

Bachelors of Science in Computer Science

Minor in Mathematics

2014 GPA: 3.97 (University Honors)

EXPERIENCE

Software Engineer — July 2016 – Ongoing

Qatar Computing Research Institute

- Developed award-winning Arabic **Machine Translation** models
- Led the software engineering efforts to develop **toolkits, libraries and scalable APIs** for the translation & interpretation team
- Developed research assets to simplify **interpretation** of deep NLP models
- Co-authored over 25 research papers in areas of machine translation and **explainable AI** in top tier conferences and journals
- Co-taught **Deep Learning** courses to 100+ students

Co-Founder — March 2015 – March 2016

Problemia

Technical lead for designing and developing an **educational platform for teachers**. Managed a team of four and defined the technical direction of the platform

3D Content Creator — Summer 2012

Williams F1

Created **interactive 3D content** for a simulator tuned for Qatar's driving environment

Research Intern — Summer 2012

Robotics Institute, Carnegie Mellon

Designed and implemented a **user interface to analyze results** for a highly distributed data collection system, the AirBoats project

PROJECTS

NeuroX: Explainable AI — QCRI 2018 – Present

- Analyzed and interpreted Machine Translation and Language models like BERT, RoBERTa and GPT-2
- Developed a neural network diagnostic toolkit for finding and analyzing important neurons for natural language processing models

neurox.qcri.org

Misinformation Detector — QCRI 2020

Trained and deployed models through a REST API to detect misinformation in tweets related to the COVID-19 pandemic

Text-to-Speech — QCRI 2019 – Present

- Developed a backend and associated REST API to host and run text-to-speech models with accelerated inference capabilities
- Created an ML-Ops pipeline for seamless deployment of models

tts.qcri.org

Video News Bot — QCRI 2017

Developed a bot that summarizes a news story into a video with relevant visuals and voice-overs

Live Speech Translation — QCRI 2017 - 2020

Designed and developed a live Arabic ↔ English transcription and translation app with a robust backend enabling live broadcastable sessions. Served 100+ hours of live speech translation sessions

st.qcri.org

Machine Translation API — QCRI 2016 - Present

Developed a distributed backend to manage multiple machine translation engines built at QCRI and a simple to use user-facing REST API. Served over 140 million requests from 40+ countries so far

mt.qcri.org

ASL2Speech — Stanford 2015

Developed a pattern mining approach to translate sign language into speech using on-body sensors

PhdWriter — CMU 2013

Designed and developed a collaborative research tool based on web technologies with real-time collaboration to facilitate better research

SKILLS

PyTorch | Keras | Tensorflow | NodeJS | Flask | React | Docker | Python | C++ | Javascript

Deep Learning | Machine Learning | Unix | Web Applications | Backend Development | Scripting | NLP Processing | Containerization | Code & Model Versioning | Testing

TEACHING

Deep Learning for NLP
Carnegie Mellon University

Guest Lecturer | Qatar | October 2020

Deep Learning for NLP
University of Duisberg-Essen

Co-Lecturer | Germany | September 2019

Deep Learning for NLP
International Spring School in Advanced Language Engineering (ISSALE)

Co-Lecturer | Sri Lanka | March 2019

Deep Learning for NLP
University of Duisberg-Essen

Co-Lecturer | Germany | April 2018

Deep Learning for Machine Translation
Computational Linguistics Fall School

Co-Lecturer | Germany | September 2017

Organized by the German Linguistic Society (Deutsche Gesellschaft für Sprachwissenschaft, DGfS).

ACHIEVEMENTS

Best Audience Experience
BBC NewsHack 2017

Best Arabic machine translation system
International Conference on Spoken Language Translation (IWSLT) 2016

Best MYO hack
Hack Overflow, Stanford 2015

Hamad Bin Khalifa University President's Award
Qatar Foundation 2014

Outstanding Academic Achievement
Carnegie Mellon 2014

Senior Student Leadership Award
Carnegie Mellon 2014

1st Place
Oman Collegiate Programming Competition 2012

PUBLICATIONS

- Alam, F., Dalvi, F., Shaar, S., Durrani, N., Mubarak, H., Nikolov, A., Da San Martino, G., Abdelali, A., Sajjad, H., Darwish, K., & Nakov, P. (2021). Fighting the covid-19 infodemic in social media: A holistic perspective and a call to arms. *Proceedings of the International AAAI Conference on Web and Social Media*, *15*(1), 913–922. https://ojs.aaai.org/index.php/ICWSM/article/view/18114
- Alam, F., Shaar, S., Dalvi, F., Sajjad, H., Nikolov, A., Mubarak, H., Da San Martino, G., Abdelali, A., Durrani, N., Darwish, K., Al-Homaid, A., Zaghouani, W., Caselli, T., Danoe, G., Stolk, F., Bruntink, B., & Nakov, P. (2021). Fighting the COVID-19 infodemic: Modeling the perspective of journalists, fact-checkers, social media platforms, policy makers, and the society. *Findings of the Association for Computational Linguistics: EMNLP 2021*, 611–649. https://aclanthology.org/2021.findings-emnlp.56
- Durrani, N., Sajjad, H., & Dalvi, F. (2021). How transfer learning impacts linguistic knowledge in deep NLP models? *Findings of the Association for Computational Linguistics: ACL-IJCNLP 2021*, 4947–4957. https://doi.org/10.18653/v1/2021.findings-acl.438
- Sajjad, H., Kokhlikyan, N., Dalvi, F., & Durrani, N. (2021). Fine-grained interpretation and causation analysis in deep NLP models. *Proceedings of the 2021 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies: Tutorials*, 5–10. https://www.aclweb.org/anthology/2021.naacl-tutorials.2
- *Belinkov, Y., *Durrani, N., Dalvi, F., Sajjad, H., & Glass, J. (2020). On the linguistic representational power of neural machine translation models. *Computational Linguistics*, *46*(1), 1–52. https://doi.org/10.1162/coli_a_00367
- Dalvi, F., Sajjad, H., Durrani, N., & Belinkov, Y. (2020). Analyzing redundancy in pretrained transformer models. *Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 4908–4926. https://doi.org/10.18653/v1/2020.emnlp-main.398
- Durrani, N., Sajjad, H., Dalvi, F., & Belinkov, Y. (2020). Analyzing individual neurons in pre-trained language models. *Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 4865–4880. https://doi.org/10.18653/v1/2020.emnlp-main.395
- Sajjad, H., Abdelali, A., Durrani, N., & Dalvi, F. (2020). AraBench: Benchmarking dialectal Arabic-English machine translation. *Proceedings of the 28th International Conference on Computational Linguistics*, 5094–5107. https://doi.org/10.18653/v1/2020.coling-main.447
- *Wu, J., *Belinkov, Y., Sajjad, H., Durrani, N., Dalvi, F., & Glass, J. (2020). Similarity analysis of contextual word representation models. *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics*, 4638–4655. https://doi.org/10.18653/v1/2020.acl-main.422

- Aker, A., Sliwa, A., Dalvi, F., & Bontcheva, K. (2019). Rumour verification through recurring information and an inner-attention mechanism. *Online Social Networks and Media*, *13*, 100045. https://doi.org/https://doi.org/10.1016/j.osnem.2019.07.001
- Bau, A., Belinkov, Y., Sajjad, H., Durrani, N., Dalvi, F., & Glass, J. (2019). Identifying and controlling important neurons in neural machine translation. *International Conference on Learning Representations*. https://openreview.net/forum?id=H1z-PsR5KX
- *Dalvi, F., *Durrani, N., *Sajjad, H., Belinkov, Y., Bau, A., & Glass, J. (2019). What is one grain of sand in the desert? analyzing individual neurons in deep nlp models. *Proceedings of the AAAI Conference on Artificial Intelligence*, *33*(01), 6309–6317. https://doi.org/10.1609/aaai.v33i01.33016309
- Dalvi, F., Nortonsmith, A., Bau, A., Belinkov, Y., Sajjad, H., Durrani, N., & Glass, J. (2019). NeuroX: A toolkit for analyzing individual neurons in neural networks. *Proceedings of the AAAI Conference on Artificial Intelligence*, *33*(01), 9851–9852. https://doi.org/10.1609/aaai.v33i01.33019851
- Durrani, N., Dalvi, F., Sajjad, H., Belinkov, Y., & Nakov, P. (2019). One size does not fit all: Comparing NMT representations of different granularities. *Proceedings of the 2019 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies, Volume 1 (Long and Short Papers)*, 1504–1516. https://doi.org/10.18653/v1/N19-1154
- Barrón-Cedeño, A., Da San Martino, G., Zhang, Y., Ali, A. M., & Dalvi, F. (2018). Qlusty: Quick and dirty generation of event videos from written media coverage. *NewsIR@ECIR*, *2079*, 27–32.
- *Dalvi, F., *Durrani, N., Sajjad, H., & Vogel, S. (2018). Incremental decoding and training methods for simultaneous translation in neural machine translation. *Proceedings of the 2018 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies, Volume 2 (Short Papers)*, 493–499. https://doi.org/10.18653/v1/N18-2079
- Shaar, S., Razak, S., Dalvi, F., & Moosavi, S. A. H. (2018). Group identification in crowded environments using proximity sensing. *43rd IEEE Conference on Local Computer Networks, LCN 2018, Chicago, IL, USA, October 1-4, 2018*, 319–322. https://doi.org/10.1109/LCN.2018.8638142
- Belinkov, Y., Durrani, N., Dalvi, F., Sajjad, H., & Glass, J. (2017). What do neural machine translation models learn about morphology? *Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*, 861–872. https://doi.org/10.18653/v1/P17-1080
- Belinkov, Y., Màrquez, L., Sajjad, H., Durrani, N., Dalvi, F., & Glass, J. (2017). Evaluating layers of representation in neural machine translation on part-of-speech and semantic tagging tasks. *Proceedings of the Eighth International Joint Conference on Natural Language Processing (Volume 1: Long Papers)*, 1–10. https://www.aclweb.org/anthology/I17-1001
- Dalvi, F., Durrani, N., Sajjad, H., Belinkov, Y., & Vogel, S. (2017). Understanding and improving morphological learning in the neural machine translation decoder. *Proceedings of the Eighth International Joint Conference on Natural Language Processing (Volume 1: Long Papers)*, 142–151. https://www.aclweb.org/anthology/I17-1015
- Dalvi, F., Zhang, Y., Khurana, S., Durrani, N., Sajjad, H., Abdelali, A., Mubarak, H., Ali, A., & Vogel, S. (2017). QCRI live speech translation system. *Proceedings of the Software Demonstrations of the 15th Conference of the European Chapter of the Association for Computational Linguistics*, 61–64. https://www.aclweb.org/anthology/E17-3016
- Durrani, N., & Dalvi, F. (2017). Continuous space reordering models for phrase-based mt. *International Workshop on Spoken Language Translation*.
- Sajjad, H., Dalvi, F., Durrani, N., Abdelali, A., Belinkov, Y., & Vogel, S. (2017). Challenging language-dependent segmentation for Arabic: An application to machine translation and part-of-speech tagging. *Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics (Volume 2: Short Papers)*, 601–607. https://doi.org/10.18653/v1/P17-2095
- Sajjad, H., Durrani, N., Dalvi, F., Belinkov, Y., & Vogel, S. (2017). Neural machine translation training in a multi-domain scenario. *International Workshop on Spoken Language Translation*.
- Durrani, N., Dalvi, F., Sajjad, H., & Vogel, S. (2016). Qcri machine translation systems for iwslt 16. *International Workshop on Spoken Language Translation*.
- Eldesouki, M., Dalvi, F., Sajjad, H., & Darwish, K. (2016). QCRI @ DSL 2016: Spoken Arabic dialect identification using textual features. *Proceedings of the Third Workshop on NLP for Similar Languages, Varieties and Dialects (VarDial3)*, 221–226. https://www.aclweb.org/anthology/W16-4828