Muhammad Imran
Senior Scientist
Qatar Computing Research Institute
Hamad Bin Khalifa University, Qatar
Homepage: `https://mimran.me/` - Email: mimran@hbku.edu.qa

RESEARCH INTERESTS

I work on **AI for Social Good** problems. Specifically, I use non-traditional data sources such as social networks and remote sensing, during time-critical events such as natural and human-induced disasters to analyze, extract, and summarize useful information for humanitarian aid[1]. Moreover, I develop algorithms and technologies useful for stakeholders to gain situational awareness and actionable information for rapid decision-making during disasters.

Research areas: Social computing, crisis informatics, artificial intelligence, natural language processing, applied machine learning, image processing

EDUCATION

Ph.D. in Computer Science (2009 − 2013)
University of Trento, Italy

Master of Science in Computer Science (2005 − 2007)
Mohammad Ali Jinnah University, Pakistan

Bachelor of Science in Computer Science (2000 − 2003)
Allama Iqbal Open University, Pakistan

AWARDS & HONORS

Best Paper Award (2020): Paper title: "Rapid Damage Assessment Using Social Media Images by Combining Human and Machine Intelligence", the 17th International Conference on Information Systems for Crisis Response and Management (ISCRAM) in 2019, Blacksburg, Virginia, USA. (Role: First author)

Best Insight Paper Award (2019): Paper title: "Identifying Disaster Damage Images Using a Domain Adaptation Approach", the 16th International Conference on Information Systems for Crisis Response and Management (ISCRAM) in 2020, Valencia, Spain. (Role: Team lead)

Best Paper Runner-up Award (2019): Paper title: "CrisisDPS: Crisis Data Processing Services", the 16th International Conference on Information Systems for Crisis Response and Management (ISCRAM) in 2019, Valencia, Spain. (Role: Team lead)

Best Paper Runner-up Award (2017): Paper title: "Automatic Image Filtering on Social Networks Using Deep Learning and Perceptual Hashing During Crises", the 14th International Conference on Information Systems for Crisis Response and Management (ISCRAM), Albi, France. (Role: Team lead)

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[1] `https://en.wikipedia.org/wiki/Humanitarian_aid`

Best Paper Award (2016): Paper title: "Cross-Language Domain Adaptation for Classifying Crisis-Related Short Messages", the 13th International Conference on Information Systems for Crisis Response and Management (ISCRAM) in 2016, Rio de Janeiro, Brazil. (Role: First author)

Best Paper Award (2013): Paper title: " Extracting Information Nuggets from Disaster-Related Messages in Social Media", the 10th International Conference on Information Systems for Crisis Response and Management (ISCRAM) in 2013, Baden-Baden, Germany. (Role: First author)

Grand Prize Winner at the Open Source Software World Challenge (2015): AIDR[2] project awarded the Grand Prize in the 2015 Open Source Software World Challenge. (Role: Team lead)

Winner of the WISH Innovation Competition (2016): AIDR-SMS technology wins the innovation competition organized by the World Innovation Summit for Health 2016.

Awarded on the World Intellectual Property Day award: The Ministry of Economy and Commerce Qatar and Qatar University (2017) awarded our AIDR technology for its impactful utilization to improve lives during disasters.

PhD Scholarship Winner (2009-2013): Recipient of the fully funded PhD scholarship from the University of Trento, Italy.

MEDIA COVERAGE

Earth Science magazine (Eos) of the American Geophysical Union[3] featured our joint work on Global Landslide Detector with the British Geological Survey and European Meditariance Seisemilogical Center (2022).

UNDRR[4] featured our joint work on Global Landslide Detector with the British Geological Survey and European Meditariance Seisemilogical Center (2022).

The Pennsylvania State University[5] features our joint work on predicting real-time food shortages during COVID-19 (2022).

Cision PRWeb[6] features our joint work on using tweets emotions to predict real-time food insufficiency (2022).

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[2] http://aidr.qcri.org/

[3] https://eos.org/articles/new-landslide-reporting-tool-uses-social-media-and-ai

[4] https://www.preventionweb.net/news/new-landslide-reporting-tool-uses-social-media-and-ai

[5] https://www.psu.edu/news/agricultural-sciences/story/using-tweets-predict-real-time-food-shortages/

[6] http://www.prweb.com/releases/using_tweets_emotions_to_predict_real_time_food_insufficiency/prweb18614447.htm

World Economic Forum[7] cites our Crisis Computing work on AI and social media for social good in the article about how AI improves disaster resilience and relief efforts (2020).

Gulf-Times[8] features our work on mining Education Insecurity data from social media sources in collaboration with Education Above All and UN OCHA's Humanitarian Data Centre (2020).

United Nations OCHA Humanitarian Data Centre[9] published my interview on the role of artificial intelligence and predictive modeling for disaster response and management (2019).

Fast Company[10] features and publishes my interview on the deployment of our AIDR system during the 2018 California wildfires.

Science X[11] features our work published at the SIGIR 2018 conference on improving disaster response through auto-generated short summaries of Twitter data during disasters.

New Scientist[12] features our joint work with UNICEF on using SMS (short messages) to understand public health issues and queries related to AIDS/HIV in Zambia.

WIRED Magazine[13] covers various aspects of AIDR & MicroMappers deployment during the 2013 earthquake in Pakistan.

Nature Journal[14] features the use of our innovative machine learning and crowdsourcing technologies (AIDR & MicroMappers) during the typhoon Haiyan in the Philippines.

BBC News[15] features the digital humanitarian response to the 2015 Nepal earthquake using our humanitarian technologies.

Foreign Affairs[16] discusses the deployment of the AIDR system during the 2015

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[7] https://www.weforum.org/agenda/2020/01/natural-disasters-resilience-relief-artificial-intelligence-ai-mckinsey/
[8] https://www.gulf-times.com/story/672450/HBKU-s-Qatar-Computing-Research-Institute-at-foref
[9] https://centre.humdata.org/community-qa-the-qatar-computing-research-institute/
[10] https://www.fastcompany.com/90269483/how-ai-software-could-help-fight-future-wildfires
[11] https://phys.org/news/2018-07-disaster-response-twitter.html
[12] https://www.newscientist.com/article/2083044-ai-helps-answer-thousands-of-health-queries-in-zambia-via-sms/
[13] http://www.wired.co.uk/news/archive/2013-09-30/digital-humanitarianism
[14] http://www.nature.com/news/crowdsourcing-goes-mainstream-in-typhoon-response-1.14186
[15] http://www.bbc.co.uk/programmes/p02pkd9w
[16] https://www.foreignaffairs.com/articles/nepal/2015-06-01/virtual-aid-nepal

Nepal earthquake.

Forbes[17] features the research and development of our machine learning technologies at QCRI for humanitarian response.

The Wall Street Journal (WSJ)[18] interviews a former colleague (Patrick Meier) for our joint work on social mapping to help rescue teams with a detailed data-driven map generated by our humanitarian technologies developed at QCRI during various typhoons in the Philippines.

Mashable[19] highlights the successes of our humanitarian technologies (AIDR & MicroMappers) during various typhoons in the Philippines.

Voice of America[20] features our AIDR and MicroMappers technologies and describes how AI, tweets and texts speed up relief efforts in Nepal during the 2015 earthquake.

Gulf News[21] discusses how the next-generation technologies being developed at QCRI can assist humanitarian organizations coping with an overflow of information from social media.

Automated Traders[22] features AIDR deployment during the 2015 Nepal earthquake and discusses how machine learning helps humanitarian agencies turn big data into informed decisive action.

Brookings[23] features how AIDR and MicroMappers technologies are useful for digital humanitarians and disaster response.

Data Drive Journalism[24] features our AIDR technology and the use of machine learning and human computation for humanitarian crises.

Gulf Times[25] publishes the news of the Grand prize award that our AIDR tech-

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[17]http://www.forbes.com/sites/skollworldforum/2013/05/02/crisis-maps-harnessing-the-power-of-big-data-to-deliver-humanitarian-assistance/#4d2e3f111533

[18]http://www.wsj.com/video/social-mapping-helps-rescuers-in-philippines/F4510A7D-9040-4D89-8852-2F142A7827A2.html

[19]http://mashable.com/2015/02/06/digital-humanitarians#6G78o2Z9xkqU

[20]http://www.voanews.com/content/drone-pilots-artificial-intelligence-tweets-and-texts-speed-up-relief-efforts-in-nepal/2744051.html

[21]http://gulfnews.com/news/uae/emergencies/netizens-help-respond-to-natural-disasters-1.1594421

[22]http://www.automatedtrader.net/headlines/153695/nepal-earthquake-deploying-ai-in-disaster-relief-efforts

[23]http://www.brookings.edu/blogs/techtank/posts/2015/02/19-digital-humanitarians-meier

[24]http://datadrivenjournalism.net/resources/artificial_intelligence_for_disaster_response_aidr

[25]http://www.gulf-times.com/story/465584/QCRI-wins-top-prize-for-its-technology

nology won in the 2015 Open Source Software World Challenge.

The Peninsula[26] features our Grand prize award won by the AIDR technology in the 2015 Open Source Software World Challenge.

Eastern Kentucky University[27] features our AIDR technology and its deployments during the 2015 Nepal earthquake and the 2015 Chile earthquake in a blog post about the benefits & challenges of using artificial intelligence for emergency management.

Qatar News Agency[28] covers the news of the Grand prize award of our AIDR technology in the 2015 Open Source Software World Challenge.

Gulf Times, Arab News, Al Arab, Marhaba Newspaper, Qatar Tribune, The Peninsula, Raya, Qatar News Agency (QNA), Qatar is Booming, Fana News, and QANA[29] publish the news about the AIDR-SMS technology wins The World Innovation Summit for Health (WISH) competition.

SELECTED PUBLICATIONS

Full publications list: `https://mimran.me/publications`
Google Scholar: `https://scholar.google.com/citations?user=z8niHlEAAAAJ`

Journal Articles

1. Muhammad Imran, Umair Qazi, Ferda Ofli. TBCOV: Two Billion Multilingual COVID-19 Tweets with Sentiment, Entity, Geo, and Gender Labels. Data 2022, 7(1), 8, January 2022; https://doi.org/10.3390/data7010008.

2. Rizwan Sadiq, Zainab Akhtar, Muhammad Imran, Ferda Ofli. Integrating remote sensing and social sensing for flood mapping, Remote Sensing Applications: Society and Environment, 2022, https://doi.org/10.1016/j.rsase.2022.100697.

3. Catherine VL Pennington, RÃ©my Bossu, Ferda Ofli, Muhammad Imran, Umair W Qazi, Julien Roch, Vanessa J Banks. A near-real-time global landslide incident reporting tool demonstrator using social media and artificial intelligence, International Journal of Disaster Risk Reduction, July 2022. https://doi.org/10.1016/j.ijdrr.2022.103089.

4. Goetz, Stephan J., Connor Heaton, Muhammad Imran, Yuxuan Pan, Zheng Tian, Claudia Schmidt, Umair Qazi, Ferda Ofli, and Prasenjit Mitra. Food insufficiency and Twitter emotions during a pandemic. Applied Economic Perspectives and Policy, 2022. https://doi.org/10.1002/aepp.13258.

5. Ethan Weber, Dim P. Papadopoulos, Agata Lapedriza, Ferda Ofli, Muhammad Imran, Antonio Torralba: Incidents1M: a large-scale dataset of images with

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[26] `http://www.thepeninsulaqatar.com/news/qatar/361216/qcri-system-wins-open-source-software-world-challenge-2015-grand-prize`

[27] `https://safetymanagement.eku.edu/blog/the-benefits-challenges-of-using-artificial-intelligence-for-emergency-management/`

[28] `http://www.qna.org.qa/en-us/News/15120700400062/QCRI-Humanitarian-Technology-Wins-the-Open-Source-Software-World-Challenge-Grand-Prize`

[29] `http://mimran.me/misc/media_coverage_AIDR_WISH2016.pdf`

natural disasters, damage, and incidents. Accepted in IEEE Transactions on Pattern Analysis and Machine Intelligence, 2022.

6. Ingmar Weber, Muhammad Imran, Ferda Ofli, Fouad Mrad, Jennifer Colville, Mehdi Fathallah, Alissar Chaker, Wigdan Seed Ahmed: Non-Traditional Data Sources: Providing Insights into Sustainable Development. Communications of the ACM (CACM), 2021. DOI: https://doi.org/10.1145/3447739. (Impact Factor: 6.98)

7. Loris Belcastro, Fabrizio Marozzo, Domenico Talia, Paolo Trunfio, Francesco Branda, Themis Palpanas, Muhammad Imran. Using Social Media for Sub-Event Detection during Disasters. In the Journal of Big Data, 2021. (Impact Factor: 2.50)

8. Irfan Ullah, Sharifullah Khan, Muhammad Imran, Young-Koo Lee: Rweet-Miner: Automatic Identification and Categorization of Help Requests on Twitter during Disasters. In Expert Systems With Applications Journal, 2021. DOI: https://doi.org/10.1016/j.eswa.2021.114787. (Impact Factor: 5.45)

9. Muhammad Imran, Ferda Ofli, Doina Caragea, Antonio Torralba. Using AI and Social Media Multimodal Content for Disaster Response and Management: Opportunities, Challenges, and Future Directions. In the Information Processing and Management (IP&M) journal, Volume 57, Issue 5, 2020.

10. Kiran Zahra, Muhammad Imran, Frank Ostermann. Automatic Identification of Eyewitness Messages on Twitter During Disasters. In *the Journal of Information Processing and Management (IP&M)*, Volume 57, Issue 1, 2020.

11. Starr Roxanne Hiltz, Amanda Hughes, Muhammad Imran, Linda Plotnick, Robert Power, Murray Turoff. Exploring the Usefulness and Feasibility of Software Requirements for Social Media Use in Emergency Management. In *the International Journal of Disaster Risk Reduction (IJDRR)*, 2020.

12. Pakhee Kumar, Ferda Ofli, Muhammad Imran, Carlos Castillo. Detection of Disaster-Affected Cultural Heritage Sites from Social Media Images Using Deep Learning Techniques. Accepted in the ACM Journal on Computing and Cultural Heritage (JOCCH), 2020.

13. Koustav Rudra, Pawan Goyal, Niloy Ganguly, Muhammad Imran, and Prasenjit Mitra. Summarizing Situational Tweets in Crisis Scenarios: An Extractive-Abstractive Approach. Accepted for publication in *the IEEE Transactions on Computational Social Systems (IEEE TCSS)*, 2019.

14. Xukun Li, Huaiyu Zhang, Doina Caragea, Muhammad Imran. Localizing and Quantifying Infrastructure Damage Using Class Activation Mapping Approaches. *Journal of Social Network Analysis and Mining (SNAM)*, 2019. DOI: 10.1007/S13278-019-0588-4

15. Reza Mazloom, Hongmin Li, Doina Caragea, Cornelia Caragea, Muhammad Imran. A Hybrid Domain Adaptation Approach for Identifying Crisis-Relevant Tweets. *International Journal of Information Systems for Crisis Response and Management (IJISCRAM)*, Issue 2, 2019. DOI: 10.4018/IJISCRAM.2019070101

16. Christian Reuter, Stefan Stieglitz, Muhammad Imran. Social Media in Conflicts and Crises. *Behaviour & Information Technology Journal*, Taylor & Francies, 2019. DOI: 10.1080/0144929X.2019.1629025

17. Firoj Alam, Ferda Ofli, Muhammad Imran. Descriptive and Visual Summaries of Disaster Events using Artificial Intelligence Techniques: Case Studies of Hurricanes Harvey, Irma, and Maria. *Behaviour & Information Technology Journal*, Taylor & Francies, 2019. DOI: 10.1080/0144929X.2019.1610908

18. Firoj Alam, Ferda Ofli, Muhammad Imran. Processing Social Media Images by Combining Human and Machine Computing During Crises. *International Journal of Human-Computer Interaction*, 34:4, 311-327, DOI: 10.1080/10447318.2018.1427831

19. Luis Fernandez-Luque, Muhammad Imran. Humanitarian Health Computing using Artificial Intelligence and Social Media: A Narrative Literature Review. *International Journal of Medical Informatics (IJMI)*, Volume 114, 2018, Pages 136-142. DOI: 10.1016/j.ijmedinf.2018.01.015

20. Koustav Rudra, Ashish Sharma, Niloy Ganguly, Muhammad Imran. Classifying and Summarizing Information from Microblogs during Epidemics. *Journal of Information Systems Frontiers*, Springer, 2018. DOI: 10.1007/s10796-018-9844-9

21. Saptarshi Ghosh, Kripabandhu Ghosh, Debasis Ganguly, Tanmoy Chakraborty, Gareth J. F. Jones, Marie-Francine Moens, and Muhammad Imran. Exploitation of Social Media for Emergency Relief and Preparedness: Recent Research and Trends. *Journal of Information Systems Frontiers*, Springer, 2018. DOI: 10.1007/s10796-018-9878-z

22. Muhammad Imran, Prasenjit Mitra, Jaideep Srivastava. Enabling Rapid Classification of Social Media Communications During Crises. *International Journal of Information Systems for Crisis Response and Management (IJISCRAM)*, 2017. DOI: 10.4018/IJISCRAM.2016070101.

23. Ferda Ofli, Patrick Meier, Muhammad Imran, Carlos Castillo, Devis Tuia, Nicolas Rey, Julien Briant, Pauline Millet, and Stephane Joost: Combining Human Computing and Machine Learning to Make Sense of Big (Aerial) Data for Disaster Response. *Big Data Journal*, 47-59, 2016. DOI: 10.1089/big.2014.0064

24. Muhammad Imran, Carlos Castillo, Fernando Diaz, and Sarah Vieweg: Processing Social Media Messages in Mass Emergency: A Survey. *ACM Computing Surveys*. 47, 4, Article 67, 2015, DOI: 10.1145/2771588

25. Florian Daniel, Muhammad Imran, Stefano Soi, Antonella De Angeli, Christopher R. Wilkinson, Fabio Casati and Maurizio Marchese. Developing Mashup Tools for End-Users: On the Importance of the Application Domain. *International Journal of Next-Generation Computing (IJNGC)*, 2012.

26. Christian Reuter, Amanda Hughes, Starr Roxanne Hiltz, Muhammad Imran, Linda Plotnick. Editorial of the Special Issue on Social Media in Crisis Management. *International Journal of Human-Computer Interaction (IJHCI)*, 34:4, 277-279, 2018. DOI: 10.1080/10447318.2018.1427833

Book Chapters

1. Ferda Ofli, Muhammad Imran, Firoj Alam. Using Artificial Intelligence and Social Media for Disaster Response and Management: An Overview. In AI and robotics in disaster studies book, part of the Disaster Research and Management series on the Global South. Palgrave Macmillan, Singapore, October 2020.

2. Muhammad Imran, Firoj Alam, Ferda Ofli, Michael Aupetit. Mitigating the Impact of Extreme Natural Events in Developing Countries. Editors: R.J. Durrheim and B.G.N. Sewwandi, 2019. ISBN: 9789388982160.

3. Muhammad Imran, Patrick Meier, Kees Boersma. Big Data Surveillance and Crisis Management. Edited by: Kees Boersma and Chiara Fonio, Published by: Routledge, 2017. ISBN: 978-1-138-19543-1

4. Carlos Castillo, Muhammad Imran, Patrick Meier, Ji Kim Lucas, Jaideep Srivastava, Heather Leson, Ferda Ofli, Prasenjit Mitra, et al. Together We Stand—Supporting Decision in Crisis Response: Artificial Intelligence for Digital Response and MicroMappers. Edited by OCHA and partners. Published by: Tudor Rose, World Humanitarian Summit, Istanbul, pp. 93-95, May 2016. ISBN: 978-0-9568561-8-0

5. Bozzon, Alessandro, Muhammad Imran, Florian Daniel, Fabio Casati. Search Computing, Trends and Development (Lecture Notes in Computer Science & Information Systems and Applications, incl. Internet/Web, and HCI), Editors: Stefano Ceri, Marco Brambilla, 2011, Springer. ISBN: 978-3642196676

Conference and Workshop Publications (selected)

1. Muhammad Imran, Umair Qazi, Ferda Ofli, Steve Peterson, and Firoj Alam. AI for Disaster Rapid Damage Assessment from Microblogs. In Proceedings of The Thirty-Fourth Annual Conference on Innovative Applications of Artificial Intelligence (IAAI-22), February 2022.

2. Ferda Ofli, Umair Qazi, Muhammad Imran, Julien Roch, Catherine Pennington, Vanessa Banks, Remy Bossu. A Real-time System for Detecting Landslide Reports on Social Media using Artificial Intelligence. In Proceedings of the 22nd International Conference of Web Engineering (ICWE), May 2022.

3. Firoj Alam, Hassan Sajjad, Muhammad Imran, Ferda Ofli: CrisisBench: Benchmarking Crisis-related Social Media Datasets for Humanitarian Information Processing. In Proceedings of the 15th International AAAI Conference on Web and Social Media (ICWSM), 2021.

4. Firoj Alam, Umair Qazi, Muhammad Imran, Ferda Ofli: HumAID: Human-Annotated Disaster Incidents Data from Twitter with Deep Learning Benchmarks. In Proceedings of the 15th International AAAI Conference on Web and Social Media (ICWSM), 2021.

5. Zainab Akhtar, Ferda Ofli, Muhammad Imran: Towards Using Remote Sensing and Social Media Data for Flood Mapping. In Proceedings of the 18th International Conference on Information Systems for Crisis Response and Management (ISCRAM), Virginia, USA, 2021.

6. Ethan Weber, Nuria Marzo, Dim P. Papadopoulos, Aritro Biswas, Agata Lapedriza, Ferda Ofli, Muhammad Imran, Antonio Torralba. Detecting Natural Disasters, Damage, and Incidents in the Wild. In Proceedings of the 16th European Conference on Computer Vision (ECCV), 2020.

7. Umair Qazi, Muhammad Imran, Ferda Ofli. GeoCoV19: A Dataset of Hundreds of Millions of Multilingual COVID-19 Tweets with Location Information. To appear in ACM SIGSPATIAL Special, May, 2020.

8. Firoj Alam, Ferda Ofli, Muhammad Imran, Tanvirul Alam, Umair Qazi. Deep Learning Benchmarks and Datasets for Social Media Image Classification for Disaster Response. In Proceedings of the IEEE/ACM International Conference on Advances in Social Network Analysis and Mining (ASONAM), 2020.

9. (**Best Paper Award**) Muhammad Imran, Firoj Alam, Umair Qazi, Steve Peterson, and Ferda Ofli. Rapid Damage Assessment Using Social Media Images by Combining Human and Machine Intelligence. Accepted to appear at the 17th International Conference on Information Systems for Crisis Response and Management (ISCRAM), Virginia, USA, 2020.

10. Reem Suwaileh, Muhammad Imran, Tamer Elsayed, Hassan Sajjad. Are We Ready for this Disaster? Towards Location Mention Recognition from Crisis Tweets. In Proceedings of the 28th International Conference on Computational Linguistics (COLING), 2020.

11. (**Best Insight Paper Award**) Xukun Li, Doina Caragea, Cornelia Caragea, Muhammad Imran, Ferda Ofli. Identifying Disaster Damage Images Using a Domain Adaptation Approach. *In Proceedings of the 16th International Conference on Information Systems for Crisis Response and Management (ISCRAM)*, 2019, Valencia, Spain.

12. (**Best Paper Runner-up Award**) Firoj Alam, Muhammad Imran, Ferda Ofli. CrisisDPS: Crisis Data Processing Services. In Proceedings of the 16th International Conference on Information Systems for Crisis Response and Management (ISCRAM), 2019, Valencia, Spain.

13. Starr Roxanne Hiltz, Amanda Lee Hughes, Muhammad Imran, Linda Plotnick, Robert Power, and Murray Turoff. Requirements for Software to Support the use of Social Media in Emergency Management: A Delphi Study. *In Proceedings of the 16th International Conference on Information Systems for Crisis Response and Management (ISCRAM)*, 2019, Valencia, Spain.

14. Humaira Waqas, Muhammad Imran. #CampFireMissing: An Analysis of Tweets About Missing and Found People from California Wildfires. *In Proceedings of the 16th International Conference on Information Systems for Crisis Response and Management (ISCRAM)*, 2019, Valencia, Spain.

15. Firoj Alam, Shafiq Joty, Muhammad Imran. Domain Adaptation with Adversarial Training and Graph Embeddings. *In Proceedings of the 56th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2018, Melbourne, Australia.

16. Koustav Rudra, Niloy Ganguly, Pawan Goyal, Prasenjit Mitra, Muhammad Imran. Identifying Sub-events and Summarizing Information during Disasters.

In Proceedings of the 41st International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR), 2018, Michigan, USA.

17. Himanshu Zade, Kushal Shah, Vaibhavi Rangarajann, Priyanka Kshirsagar, Muhammad Imran, Kate Starbird: From Situational Awareness to Actionability: Towards Improving the Utility of Social Media Data for Crisis Response. *In Proceedings of the 21st ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW)*, 2018, New York, USA.

18. Muhammad Imran, Carlos Castillo, Fernando Diaz, Sarah Vieweg. Processing Social Media Messages in Mass Emergency: Survey Summary. *In Proceedings of the Web Conference (WWW)*, April 2018, Lyon, France.

19. Firoj Alam, Shafiq Joty, Muhammad Imran. Graph Based Semi-supervised Learning with Convolutional Neural Networks to Classify Crisis Related Tweets. *In Proceedings of the International AAAI Conference on Web and Social Media (ICWSM)*, 2018, Stanford, California, USA.

20. Firoj Alam, Ferda Ofli and Muhammad Imran. CrisisMMD: Multimodal Twitter Datasets from Seven Natural Disasters. *In Proceedings of the International AAAI Conference on Web and Social Media (ICWSM)*, 2018, Stanford, California, USA.

21. Hemant Purohit, Carlos Castillo, Muhammad Imran and Rahul Pandey: Social-EOC: Serviceability Model to Rank Social Media Requests for Emergency Operation Centers. *In Proceedings of the IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM)*, Barcelona, August 2018.

22. Hemant Purohit, Carlos Castillo, Muhammad Imran and Rahul Pandey: Ranking of Social Media Alerts with Workload Bounds in Emergency Operation Centers. *In the Proceedings of ACM/IEEE Web Intelligence*, Santiago, Chile, December 2018.

23. Xukun Li, Huaiyu Zhang, Doina Caragea, Muhammad Imran: Localizing and Quantifying Damage in Social Media Images. *In Proceedings of the IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM)*, Barcelona, August 2018.

24. Firoj Alam, Muhammad Imran, Ferda Ofli. Image4Act: Online Social Media Image Processing for Disaster Response. *In Proceedings of the IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM)*, 2017, Sydney, Australia.

25. Dat Tien Nguyen, Ferda Ofli, Muhammad Imran, Prasenjit Mitra. Damage Assessment from Social Media Imagery Data During Disasters. *In Proceedings of the IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM)*, 2017, Sydney, Australia.

26. Muhammad Imran, Sanjay Chawla, Carlos Castillo. A Robust Framework for Classifying Evolving Document Streams in an Expert-Machine-Crowd Setting. *In Proceedings of the 18th International Conference on Data Mining (ICDM)*, December 2016, Barcelona, Spain.

27. Dat Tien Nguyen, Kamela Ali Al Mannai, Shafiq Joty, Hassan Sajjad, Muhammad Imran, Prasenjit Mitra. Robust Classification of Crisis-Related Data on Social Networks using Convolutional Neural Networks. *In Proceedings of the 11th International AAAI Conference on Web and Social Media (ICWSM)*. 2017, Montreal, Canada.

28. (**Best Paper Runner-up Award**) Dat Tien Nguyen, Firoj Alam, Ferda Ofli, Muhammad Imran. Automatic Image Filtering on Social Networks Using Deep Learning and Perceptual Hashing During Crises. *In Proceedings of the 14th International Conference on Information Systems for Crisis Response And Management (ISCRAM)*. 2017 Albi, France.

29. Koustav Rudra, Ashish Sharma, Niloy Ganguly, Muhammad Imran. Classifying Information from Microblogs During Epidemics. In Proceedings of the ACM Digital Health (DH) Conference, 2017, London, United Kingdom.

30. Zoha Sheikh, Hira Masood, Sharifullah Khan, Muhammad Imran. User-Assisted Information Extraction from Twitter During Emergencies. In Proceedings of the 14th International Conference on Information Systems for Crisis Response And Management (ISCRAM), 2017 Albi, France.

31. Firoj Alam, Muhammad Imran, Ferda Ofli. Online Social Media Image Processing Using AIDR 2.0: Artificial Intelligence for Digital Response. Demoed at the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2017, Honolulu, Hawaii.

32. Muhammad Imran, Patrick Meier, Carlos Castillo, Andre Lesa, and Manuel Garcia Herranz: Enabling Digital Health by Automatic Classification of Short Messages. *In Proceedings of the 6th ACM International Conference on Digital Health (DH)*, 2016, Montreal, Canada.

33. (**Best Paper Award**) Muhammad Imran, Prasenjit Mitra, and Jaideep Srivastava: Cross-Language Domain Adaptation for Classifying Crisis-Related Short Messages. *In Proceedings of the 13th International Conference on Information Systems for Crisis Response and Management (ISCRAM)*, 2016, Rio de Janeiro, Brazil.

34. Koustav Rudra, Siddhartha Banerjee, Niloy Ganguly, Pawan Goyal, Muhammad Imran and Prasenjit Mitra. Summarizing Situational Tweets in Crisis Scenario. *In Proceedings of the 27th ACM Conference on Hypertext and Social Media (HT)*, 2016, Halifax, Canada.

35. Muhammad Imran, Prasenjit Mitra, Carlos Castillo: Twitter as a Lifeline: Human-annotated Twitter Corpora for NLP of Crisis-related Messages. In Proceedings of the 10th Language Resources and Evaluation Conference (LREC), 2016, Slovenia

36. Muhammad Imran, Carlos Castillo. Towards a Data-driven Approach to Identify Crisis-Related Topics in Social Media Streams. *Social Web for Disaster Management (SWDM'15)*, 2015, Florence, Italy.

37. Muhammad Imran, Carlos Castillo, Ji Lucas, Patrick Meier, and Jakob Rogstadius. Coordinating Human and Machine Intelligence to Classify Microblog

Communications in Crises. *In Proceedings of the 11th International Conference on Information Systems for Crisis Response and Management (ISCRAM)*, 2014. Pennsylvania, USA.

38. Muhammad Imran, Carlos Castillo, Ji Lucas, Patrick Meier, and Sarah Vieweg. AIDR: Artificial Intelligence for Disaster Response. *In Proceedings of the 23rd International Conference on World Wide Web (WWW) Companion*, 2014, Seoul, Korea.

39. Muhammad Imran and Carlos Castillo. Volunteer-powered Automatic Classification of Social Media Messages for Public Health in AIDR. *Public Health in the Digital Age workshop in the 23rd International Conference on World Wide Web (WWW)*, 2014, Seoul, Korea.

40. Sarah Vieweg, Carlos Castillo and Muhammad Imran. Integrating Social Media Communications into the Rapid Assessment of Sudden Onset Disasters. *In Proceedings of the 6th International Conference on Social Informatics (SocInfo)*, 2014.

41. (**Best Paper Award**) Muhammad Imran, Shady Elbassuoni, Carlos Castillo, Fernando Diaz and Patrick Meier. Extracting Information Nuggets from Disaster-Related Messages in Social Media. *In Proceedings of the 10th International Conference on Information Systems for Crisis Response and Management (IS-CRAM)*, May 2013, Baden-Baden, Germany.

42. Muhammad Imran, Shady Elbassuoni, Carlos Castillo, Fernando Diaz and Patrick Meier. Practical Extraction of Disaster-Relevant Information from Social Media. *Social Web for Disaster Management (SWDM'13)*, 2013, Rio de Janeiro, Brazil.

43. Muhammad Moeen Uddin, Muhammad Imran, and Hassan Sajjad. Understanding Types of Users on Twitter. *SocialCom Standford Conference 2014*, May 2014, CA, USA.

44. Soudip Roy Chowdhury, Muhammad Imran, Muhammad Rizwan Asghar, Sihem Amer-Yahia and Carlos Castillo. Tweet4act: Using Incident-Specific Profiles for Classifying Crisis-Related Messages. *In Proceedings of the 10th International Conference on Information Systems for Crisis Response and Management (ISCRAM)*, May 2013, Baden-Baden, Germany.

45. Muhammad Imran, Syed Zeeshan Haider Gillani and Maurizio Marchese. A Real-time Heuristic-based Unsupervised Method for Name Disambiguation in Digital Libraries. *2nd Workshop on Mining Scientific Publications at the Joint Conferences on Digital Libraries (JCDL)*, July 2013, Indianapolis, USA.

46. Muhammad Imran, Stefano Soi, Felix Kling, Florian Daniel, Fabio Casati and Maurizio Marchese. On the Systematic Development of Domain-Specific Mashup Tools for End-Users. *In Proceedings of the International Conference on Web Engineering (ICWE)*, July 2012, Berlin, Germany.

47. Muhammad Imran, Felix Kling, Stefano Soi, Florian Daniel, Fabio Casati and Maurizio Marchese. ResEval Mash: A Mashup Tool for Advanced Research Evaluation. *In Proceedings of the 21th International Conference on World Wide Web (WWW) Companion*, 2012, France, Lyon.

48. Muhammad Imran, Florian Daniel, Fabio Casati, Maurizio Marchese. ResEval Mash: A Mashup Tool that Speaks the Language of the User. *In Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI)*, 2012, Austin, USA.

RESEARCH AND TECHNICAL EXPERIENCE

Senior Scientist April 2021 – Present

Qatar Computing Research Institute, Qatar

Responsibilities: My research mainly centered around distilling large amounts of complex data into digestible information and maps, fulfilling decision-makers' information needs during time-critical situations. I lead a team of scientists and postdocs working to solve real-world humanitarian challenges and make progress on sustainable development goals.

Research Scientist December 2014 – March 2021

Qatar Computing Research Institute, Qatar

Responsibilities: I led the research efforts for humanitarian data processing and building technologies. Most works focused on processing large amounts of social media textual and imagery data for time-sensitive analysis during emergencies. Developed approaches to combine human and machine intelligence to solve non-trivial problems.

Post-doctoral Researcher April 2013 – December 2014

Qatar Computing Research Institute, Qatar

Responsibilities: Conducted research and developed AI-based data classification and extraction techniques to process social media data for humanitarian data challenges. I led the research and engineering efforts of QCRI's flagship project "Artificial Intelligence for Disaster Response" (AIDR) system, which uses machine learning techniques to filter, classify, and extract information critical for humanitarian aid. Thousands of end-users, including tens of humanitarian organizations worldwide, use AIDR during disasters.

Research Associate June 2012 – September 2012

Qatar Computing Research Institute, Qatar

Responsibilities: Worked on real-time analysis of social media data to predict the life span of news articles. Investigated social media exposure, visits in the first few hours, and discussion through time-series analysis techniques. Also, worked on developing machine learning models for data classification and extraction during crises.

Database Administrator/Developer July 2007 – August 2008

National University of Science & Technology, Pakistan

Responsibilities: I was responsible for designing, implementing, and installing database-specific software solutions. Furthermore, I was responsible for administering, monitoring, and maintaining the Oracle database system, including performance tuning, query execution, and tuning execution plans.

FUNDING

- Belmont Forum (NSF, UKRI, QNRF, JST, CNR), Title: Re-Energize Gover-

nance of Disaster Risk Reduction and Resilience for Sustainable Development, Consortium partners: University College London (UK-consortium lead), the University of North Carolina at Chapel Hill (USA), Qatar Computing Research Institute (Qatar), Waseda University (Japan), University of Salerno (Italy), $2,115,874, 2020–2023. (Role: Lead PI from Qatar)

- Qatar Foundation, Title: Humanitarian Image Analysis, Partners: Massachusetts Institute of Technology (MIT), Qatar Computing Research Institute (QCRI), $350,000, 2019–2020. (Role: Co-PI)

- Qatar Science & Technology Park (QSTP), Title: Artificial INtelligent GEo-Location (AINGEL), $84,000, 2015–2016. (Role: Lead PI)

PROFESSIONAL ACTIVITIES

-**Keynotes:**

- "Social Media for Emergency Response: From Research to Practice", at The 2nd Social Media for Disaster Risk Management: Researchers Meet Practitioners workshop organized by Joint Research Center (JRC), June 7, 2022.

- "How AI is Transforming Disaster Response" at the International Symposium on IoT & ML for Ecosystem Restoration Multi-hazard Resilience, June 2021, (online).

- "The Role of Social Media and Artificial Intelligence for Disaster Response" at the 13th International Conference on Information Systems for Crisis Response and Management (ISCRAM), 2016, Rio de Janeiro, Brazil.

- "Time-Critical Analysis of Evolving Social Media Streams During Sudden-Onset Events" at the Exploitation of Social Media for Emergency Relief and Preparedness (SMERP) workshop, co-located with European Conference on Information Retrieval (ECIR), 2017, Aberdeen, United Kingdom.

- "Social Computing: A Lifeline During Mass Convergence Events" at the International Conference on Innovative Computing (ICIC), 2016, Lahore, Pakistan.

- **Invited talks:**

- (Guest lecture): "AI and Social Media for Social Good", at The University of Sheffield, May 17, 2022.

- (Invited talk panelist): "Overview of the Two Billion Multilingual COVID-19 Tweets with Sentiment, Entity, Geo, and Gender Labels dataset", at The Middle East Conference, February 6, 2022.

- (Guest lecture): "Mapping Education Insecurity using AI", at Georgetown University in Qatar, February 15, 2022.

- (Webinar) "AI and Social Media for Social Good". Webinar series organized by Re.Work about AI for Good, June 2020. video recording: `https://www.youtube.com/watch?v=L0Ceu-WRbIU`

- "Harnessing Social Media and Survey Text Mining for Covid-19 Socio-economic Impact Assessments and Disaster Response and Recovery: Some

Evidence from Ecuador, Egypt, and Lebanon", With Donny El Costa at the UNDP-SEAI Webinar series, Nov 2020, (online).

- (Guest lecture) "Using AI and Social Media for Education Insecurity Data Mining", At Georgetown University in Qatar. September 2020 (online).

- "Computer Vision for Damage Assessment", World Food Program (WFP) computer vision for damage assessment workshop, Nov 2020, (online).

- "Artificial Intelligence for Disaster Response", At Istanbul Technical University, Turkey, August 2020 (online).

- US Chamber Foundation, "Artificial Intelligence for Disaster Response", 2019, Washington DC, USA.

- IBM Research Lab Zurich, "AI and Social Media for Social Good", 2019, Zurich, Switzerland.

- the University of Zurich, "AI and Social Media for Social Good", 2019, Zurich, Switzerland.

- CAIR: Artificial Intelligence Research Centre, "Time-Critical Analysis of Multi-modal Social Media Data for Disaster Response", 2019, Kristiansand, Norway.

- CIEM: Centre for Integrated Emergency Management at the University of Agder, "Artificial Intelligence for Disaster Response", 2019, Kristiansand, Norway.

- the University of Chile, "Using Social Media and AI for Disaster Response and Associated Challenges", 2018, Santiago, Chile.

- Doha Forum, "Artificial Intelligence for Mining Attacks on Education Data on Social Media", 2018, Doha, Qatar.

- European Commission Joint Research Center (JRC),"Artificial Intelligence for Disaster Response, 2016, Ispra, Italy.

- UNESCO: United Nations Educational, Scientific and Cultural Organization, "Artificial Intelligence for Disaster Response", 2015, Geneva, Switzerland.

- Impacts of Extreme Natural Events: Science and Technology for Mitigation (IRENE) round table, "Enabling Rapid Disaster Response Using AI and Social Media", 2017, Colombo, Sri Lanka.

- Higher Education Commission (HEC) Pakistan Data Science workshop, "Real-time Processing of Social Media Content for Social Good", 2017, Islamabad, Pakistan.

- Machine Learning and Data Analytics Symposium (MLDAS), "Artificial Intelligence for Disaster Response", 2014, Doha, Qatar.

- Global Entrepreneurship Week at Qatar Science and Technology Park, "Introduction to Machine Learning: An Application to Disaster Response", 2015, Doha, Qatar.

- SeCO Workshop on Search Computing, 2010, Como, Milan, Italy.

- **Editor and special issues:**

- Associate Editor for Frontiers in Big Data Mining and Management, (Sep 2022 – to-date).
- Review Editor of Data Mining and Management in the journal of Frontiers in Big data (Sep 2020 - Sep 2022)
- Big Data Research: Special Issue on Big Data in Epidemics, 2020.
- Information Processing & Management journal (IP&M) Elsevier: Special Issue on Using AI and Social Media for Disaster Response and Management, 2019.
- Behaviour & Information Technology journal (Taylor & Francis): Special Issue on Social Media in Conflicts and Crises, 2018.
- International Journal of Human-Computer Interaction (IJHCI): Special Issue on Social Media in Crisis Management, 2017.
- Journal of Information System Frontiers: Special Issue on Exploitation of Social Media for Emergency Relief and Preparedness, 2017.

- **Track Chairing:**
  - International Conference on Information Systems for Crisis Response and Management (ISCRAM), 2015 – 2023.

- **Program committee member:**
  - The Web Conference (WWW, 2020, 2021, 2022)
  - International Conference on Web Search and Data Mining (WSDM 2020, 2021, 2022)
  - International ACM Conference on Research and Development in Information Retrieval (SIGIR 2018, 2019)
  - International AAAI Conference on Web And Social Media (ICWSM-2016, 2017, 2018, 2019, 2020)
  - International Conference on Digital Health (DH 2015, 2016, 2017, 2018)
  - International Workshop on Social Web for Disaster Management (SWDM 2015, 2016)
  - International Conference on Information Systems for Crisis Response and Management-Mediterranean (ISCRAM-Med 2014, 2015, 2016, 2017, 2018, 2019)
  - ICWSM Workshop on Standards and Practices in Large-Scale Social Media Research (2015)
  - International Conference on Emerging Technologies (ICET 2014)
  - Computational Social Science Winter Symposium (CSSWS 2014)

- **Reviewer:**
  - ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW 2017)
  - ACM Transactions on Information Systems
  - Information Processing & Management Journal
  - Information Systems Frontiers Journal
  - Computer Networks Journal

- International Conference on Web Information System Engineering (WISE 2014)
- International Conference on Information Systems for Crisis Response and Management (ISCRAM 2014, 2015, 2016, 2017, 2018, 2019)
- ACM Web Science Conference (WebSci 2014)
- International Conference on Web Engineering (ICWE 2012)

- **Professional member:**
  - ACM professional member since 2012
  - ISCRAM professional member since 2012
  - IEEE professional member since 2016

CERTIFICATIONS
- **Oracle Certified Professional (OCP)**
  Track: Database Administration
  California, USA

TECHNICAL SKILLS

- **Programming and machine learning libraries:**
  - JAVA— SE, EE, EJBs (expert level)
  - Weka, Scikit-learn, keras machine learning tools (expert level)
  - Python (advanced level)
  - R (beginner level)
  - Web services development: Restful, SOAP (expert level)
  - Microsoft .NET, C#, ASP.NET (advanced level)

- **Databases**:
  - Postgres (advanced level)
  - Redis (expert level)
  - Oracle 9i, 10g, 11g (expert level)
  - MySQL, MS-SQL Server (advanced level)

- **Miscellaneous expertise**:
  - Experienced in designing and implementing real-time distributed data-intensive processing pipelines and systems
  - Good hands-on knowledge of various machine learning and data mining libraries: Weka, Scikit-learn
  - Good knowledge of Object-Oriented Programming (OOP)
  - Experienced in designing and developing solutions using Service Oriented Architecture (SOA), 3-tier, N-tier architecture, and distributed applications
  - Experienced in using development tools such as NetBeans, Eclipse, Visual Studio.Net, and technologies such as Maven, Base Camp, Slack, Pivotal Tracker

TEACHING EXPERIENCE

- Teaching Assistant, "Service-Oriented Architecture and Applications", University of Trento, 2009 – 2010
- Teaching Assistant, "Laboratory for Service Design and Engineering", University of Trento, 2010 – 2011
- Teaching Assistant, "Laboratory for Service Design and Engineering", University of Trento, 2011 – 2012

MENTORING

Current and former students supervised/mentored

Ph.D.	Masters	Undergraduate
Reem Ali Suwaileh	Michele Lunelli	Abbas Ahmed (intern)
Koustav Rudra	Felix Kling	Adhithya Arun (intern)
Humaira Waqas (intern)	Saher Shafait	Zainab Akhtar (intern)
	Simone Dalcastagne	Safin Bayes (intern)
	Matteo Bertoni	Manan Ghadi (intern)
	Massimo Pacher	Bharath Kumar (intern)
	Irfan Ullah	Shruti Singala (intern)
	Zoha Sheikh	Mudra Patel (intern)
	Hira Masood	Hussein Ahmed Zaky (intern)
		Amit Patel (intern)
		Kiran Krishnan (intern)
		Maimoon Siddiqui (intern)
		Meghana Yechuri (intern)
		Nandhini (intern)
		Yusuf Ansari (intern)
		Vedkumar Patel (intern)