

## Muhammad Imran (PhD)

Research Scientist

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### RESEARCH INTERESTS

I am interested in analyzing the role of social media and microblogging platforms such as Twitter during time-critical events by using big data analysis techniques such as data mining, machine learning, and deep neural networks to solve real world problems. Moreover, I'm interested in developing novel computational techniques and technologies useful for stakeholders gain situation awareness and actionable information to enhance critical decision-making for better emergency response.

**Keywords:** *Social computing, crisis informatics, data mining, time-critical information retrieval, machine learning, crowdsourced stream processing*

### EDUCATION

**Ph.D. Computer Science** November 2009 – March 2013  
University of Trento, Trento, Italy.  
Concentration: Computer Science

**M.Sc. Computer Science** September 2005 – September 2007  
Mohammad Ali Jinnah University, Islamabad, Pakistan.  
Concentration: Computer Science

**B.S. Computer Science** January 2000 – December 2003  
Allama Iqbal Open University, Islamabad, Pakistan.  
Concentration: Computer Science

### AWARDS, HONORS, AND GRANTS

**Best Paper Award (2016):** Received the Best Paper Award at 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):** Received the Best Paper Award at the 10th International Conference on Information Systems for Crisis Response and Management (ISCRAM) in 2013, Baden-Baden, Germany. (Role: First Author)

**Finalist for Best Paper Award (2017):** Our paper “Automatic Image Filtering on Social Networks Using Deep Learning and Perceptual Hashing During Crises” nominated for Best Paper Award at the 14th International Conference on Information Systems for Crisis Response and Management (ISCRAM), Albi, France. (Role: Team leader)

**Grand Prize Winner at the Open Source Software World Challenge (2015):** AIDR<sup>1</sup> project awarded the Grand Prize in the Open Source Software World Challenge 2015 competition. (Role: Team Leader)

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

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<sup>1</sup><http://aidr.qcri.org/>

**Start-up Grant Winner (2015):** Qatar Science & Technology Park (QSTP) selected and granted our AIDR project to be launched as a start-up. (Role: Team Leader)

**Awarded on the World Intellectual Property Day** by the Ministry of Economy and Commerce Qatar and Qatar University (2017) for the impactful utilization of the AIDR technology for improving lives.

**PhD Scholarship Winner (2009-2013):** awarded by the University of Trento for PhD studies (2009-2013).

**Distinguished Position holder in MSc (2007):** Obtained Highest GPA in M.Sc. (Master of Science in Computer Science).

**MEDIA,  
MAGAZINE, AND  
JOURNAL  
COVERAGE**

**New Scientist**<sup>2</sup> features our joint work with UNICEF on SMS classification to understand public health issues and queries in Zambia.

**WIRED Magazine**<sup>3</sup> mentions various aspects of the deployment of our technologies (AIDR & MicroMappers) during the 2013 earthquake in Pakistan.

**Nature Journal**<sup>4</sup> covers the use of our machine learning and crowdsourcing technologies (AIDR & MicroMappers) during the typhoon Haiyan in the Philippines.

**BBCNews**<sup>5</sup> on digital humanitarian response to the 2015 Nepal earthquake using our humanitarian technologies.

**Forbes**<sup>6</sup> discusses about the research and development of our machine learning for humanitarian computing work at QCRI.

**The Wall Street Journal (WSJ)**<sup>7</sup> asks Patrick Meier (a former colleague) about how social mapping provides rescue teams with a detailed, data-driven map generated by our humanitarian technologies developed at QCRI during typhoons in the Philippines.

**Mashable**<sup>8</sup> highlights the successes of our humanitarian technologies (AIDR & MicroMappers) during various typhoons in the Philippines.

**Voice of America**<sup>9</sup> features our AIDR and MicroMappers technologies and describes how AI, tweets and texts speed up relief efforts in Nepal during the 2015 earthquake.

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<sup>2</sup><https://www.newscientist.com/article/2083044-ai-helps-answer-thousands-of-health-queries-in-zambia-via-sms/>

<sup>3</sup><http://www.wired.co.uk/news/archive/2013-09/30/digital-humanitarianism>

<sup>4</sup><http://www.nature.com/news/crowdsourcing-goes-mainstream-in-typhoon-response-1.14186>

<sup>5</sup><http://www.bbc.co.uk/programmes/p02pkd9w>

<sup>6</sup><http://www.forbes.com/sites/skollworldforum/2013/05/02/crisis-maps-harnessing-the-power-of-big-data-to-deliver-humanitarian-assistance/#4d2e3f111533>

<sup>7</sup><http://www.wsj.com/video/social-mapping-helps-rescuers-in-philippines/4510A7D-9040-4D89-8852-2F142A7827A2.html>

<sup>8</sup><http://mashable.com/2015/02/06/digital-humanitarians/#6G78o2Z9xkqU>

<sup>9</sup><http://www.voanews.com/content/drone-pilots-artificial-intelligence-tweets-and-texts-speed-up-relief-efforts-in-nepal/2744051.html>

**Gulf News**<sup>10</sup> discusses assisting humanitarian organisations cope with an overflow of information from social media using AIDR technology.

**Automated Traders**<sup>11</sup> features AIDR deployment during Nepal Earthquake 2015 and discusses how machine learning helps humanitarian agencies turn big data into informed, decisive action.

**Brookings**<sup>12</sup> explains how AIDR and MicroMappers technologies are useful for digital humanitarians and disaster response.

**Data Drive Journalism**<sup>13</sup> features our AIDR technology and the use of machine learning and human computation for humanitarian crises.

**Gulf Times**<sup>14</sup> publishes the news of the Grand prize award of our AIDR technology in the Open Source Software World Challenge.

**The Peninsula**<sup>15</sup> featured our Grand prize award won by AIDR technology in the Open Source Software World Challenge 2015.

**HBKU**<sup>16</sup> publishes the news of our Grand prize win in the Open Source Software World Challenge.

**Qatar News Agency**<sup>17</sup> covers the news of the Grand prize award of our AIDR technology in the 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**<sup>18</sup> featured the news of winning the WISH competition by our AIDR-SMS technology developed with UNICEF Zambia.

## SELECTED PUBLICATIONS

1. Firoj Alam, Muhammad Imran, Ferda Ofli. Image4Act: Online Social Media Image Processing for Disaster Response. Accepted for publication at the IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM), 2017, Sydney, Australia.
2. Dat Tien Nguyen, Ferda Ofli, Muhammad Imran, Prasenjit Mitra. Damage Assessment from Social Media Imagery Data During Disasters. Accepted for publication at the IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM), 2017, Sydney, Australia.
3. Muhammad Imran, Sanjay Chawla, Carlos Castillo. A Robust Framework for

<sup>10</sup><http://gulfnnews.com/news/uae/emergencies/netizens-help-respond-to-natural-disasters-1.1594421>

<sup>11</sup><http://www.automatedtrader.net/headlines/153695/nepal-earthquake-deploying-ai-in-disaster-relief-efforts>

<sup>12</sup><http://www.brookings.edu/blogs/techtank/posts/2015/02/19-digital-humanitarians-meier>

<sup>13</sup>[http://datadrivenjournalism.net/resources/artificial\\_intelligence\\_for\\_disaster\\_response\\_aidr](http://datadrivenjournalism.net/resources/artificial_intelligence_for_disaster_response_aidr)

<sup>14</sup><http://www.gulf-times.com/story/465584/QCRI-wins-top-prize-for-its-technology>

<sup>15</sup><http://www.thepeninsulaqatar.com/news/qatar/361216/qcri-system-wins-open-source-software-world-challenge-2015-grand-prize>

<sup>16</sup>[http://www.hbku.edu.qa/en/News/view\\_news/169/7/index](http://www.hbku.edu.qa/en/News/view_news/169/7/index)

<sup>17</sup><http://www.qna.org.qa/en-us/News/15120700400062/QCRI-Humanitarian-Technology-Wins-the-Open-Source-Software-World-Challenge-Grand-Prize>

<sup>18</sup>[http://mimran.me/misc/media\\_coverage\\_AIDR\\_WISH2016.pdf](http://mimran.me/misc/media_coverage_AIDR_WISH2016.pdf)

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.

4. 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.
5. **(Nominated for Best Paper 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.
6. 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.
7. **(Best Paper Award)** Muhammad Imran, Prasenjit Mitra, and Jaideep Srivastava: Cross-Language Domain Adaptation for Classifying Crisis-Related Short Messages. In *the 13th International Conference on Information Systems for Crisis Response and Management (ISCRAM)*, 2016, Rio de Janeiro, Brazil.
8. Koustav Rudra, Siddhartha Banerjee, Niloy Ganguly, Pawan Goyal, Muhammad Imran and Prasenjit Mitra. Summarizing Situational Tweets in Crisis Scenario. *Accepted for publication at the 27th ACM Conference on Hypertext and Social Media (HT)*, 2016, Halifax, Canada.
9. 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. Accepted for publication at *Big Data Journal*, 2016.
10. 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
11. 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 (June 2015), DOI=10.1145/2771588
12. 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.
13. Muhammad Imran, Carlos Castillo, Ji Lucas, Patrick Meier, and Jakob Rogstadius. Coordinating Human and Machine Intelligence to Classify Microblog Communications in Crises. *11th International Conference on Information Systems for Crisis Response and Management (ISCRAM)*, 2014. Pennsylvania, USA.
14. Muhammad Imran, Carlos Castillo, Ji Lucas, Patrick Meier, and Sarah Vieweg. AIDR: Artificial Intelligence for Disaster Response. In *Proc. of the 23th International Conference on World Wide Web (WWW) Companion*, 2014, Seoul, Korea.

15. 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 23th International Conference on World Wide Web (WWW)*, 2014, Seoul, Korea.
16. Sarah Vieweg, Carlos Castillo and Muhammad Imran. Integrating Social Media Communications into the Rapid Assessment of Sudden Onset Disasters. *In Proc. of the 6th International Conference on Social Informatics (SocInfo)*, 2014.
17. **(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 Proc. of the 10th International Conference on Information Systems for Crisis Response and Management (IS-CRAM)*, May 2013, Baden-Baden, Germany.
18. 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.
19. Muhammad Moeen Uddin, Muhammad Imran, and Hassan Sajjad. Understanding Types of Users on Twitter. *SocialCom Standford Conference 2014*, May 2014, CA, USA.
20. Soudip Roy Chowdhury, Muhammad Imran, Muhammad Rizwan Asghar, Si-hem Amer-Yahia and Carlos Castillo. Tweet4act: Using Incident-Specific Profiles for Classifying Crisis-Related Messages. *10th International Conference on Information Systems for Crisis Response and Management (ISCRAM)*, May 2013, Baden-Baden, Germany.
21. 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.
22. 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 Proc. of the International Conference on Web Engineering (ICWE)*, July 2012, Berlin, Germany.
23. 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.
24. Muhammad Imran, Felix Kling, Stefano Soi, Florian Daniel, Fabio Casati and Maurizio Marchese. ResEval Mash: A Mashup Tool for Advanced Research Evaluation. *In Proc. of the 21th International Conference on World Wide Web (WWW) Companion*, 2012, France, Lyon.
25. Muhammad Imran, Florian Daniel, Fabio Casati, Maurizio Marchese. ResEval Mash: A Mashup Tool that Speaks the Language of the User. *In Proc. of the ACM Conference on Human Factors in Computing Systems (CHI)*, 2012, Austin, USA.

(Full publications list at <http://mimran.me/publications>)

**RESEARCH AND  
TECHNICAL  
EXPERIENCE**

**Research Scientist** December 2014 – Present  
Qatar Computing Research Institute, Doha, Qatar  
*Responsibilities:* I lead the Crisis Computing group at QCRI. We focus on building computational models and innovative technologies to process high-volume social media textual and imagery data during time-critical events. We study and invent novel approaches to combine human and machine intelligence to solve non-trivial problems. Currently, interested in developing innovative solutions and technologies to help stakeholders (e.g., UN OCHA, UNICEF) gain situational awareness and actionable information from social media during time-critical and emergency events.

**AINGEL Team Leader** September 2015 – February 2016  
Qatar Science & Technology Park, Doha, Qatar  
AINGEL (Artificial INtelligent GEO-Location) Response was a start-up funded by Qatar Science and Technology Park. This project aimed at collecting and processing imagery and video feeds from social media or drones to improve insurance claims processes. AINGEL uses machine learning techniques for data processing.

**Post-doctoral Researcher** April 2013 – December 2014  
Qatar Computing Research Institute, Doha, Qatar  
*Responsibilities:* Conducted research on the application of Social Media mining methods to problems in the humanitarian crises. Humanitarian crisis computing seeks to rapidly identify situational awareness, actionable and tactical information in the big crisis data available on Social Media. Currently, leading research and technical directions of AIDR (Artificial Intelligence for Disaster Response) project. The focus of this applied research project is to use Social Media microblogging platforms like Twitter during mass convergence events and humanitarian crises in an effort to mine and classify information that can help stakeholders gain situation awareness and in their decision making processes.

**Research Associate** June 2012 – September 2012  
Qatar Computing Research Institute, Doha, Qatar  
*Responsibilities:* Mainly worked on two different research projects. The first project focused on real-time analysis of Social Media platforms such as Twitter, to predict life span of NEWS articles. Analysis of various parameters associated with articles like social media exposure in terms of their spread, first few hours visits, discussion was conducted using time-series analysis techniques. The second project focused on classification and extraction of useful information using machine learning techniques from disaster-related messages posted on Twitter to assist stakeholders in disaster response.

**PhD Researcher** November 2009 – March 2013  
University of Trento, Trento, Italy  
*Responsibilities:* Worked on the research direction of end-user development. EUD research tries to bring programming closer to the needs of end users. My PhD dissertation introduced the concept of Domain-Specific Mashups in which Web 2.0 technologies were employed to empower and enable non-programmers, non-technical users to develop ad-hoc and situational applications to perform complex data aggregation, processing and analysis tasks.

**Database Administrator/Developer** July 2007 – August 2008  
National University of Science & Technology (NUST), Islamabad, Pakistan  
*Responsibilities:* Designing, implementing, installing software solutions. Fur-

thermore, I was responsible to perform administration, monitoring, and maintenance of Oracle database systems. Moreover, performance tuning, query execution, tuning execution plans, were among other important responsibilities.

## **TEACHING EXPERIENCE**

- Service-Oriented Architecture and Applications – course held by Prof. Maurizio Marchese at the University of Trento, 2010 – 2011
- Laboratory for Service Design and Engineering – course held by Prof. Maurizio Marchese at the University of Trento, 2011 – 2012

## **PROFESSIONAL ACTIVITIES**

- **Keynotes:**
  - International Conference on Information Systems for Crisis Response and Management (ISCRAM), 2016, Rio de Janeiro, Brazil.
  - Exploitation of Social Media for Emergency Relief and Preparedness (SMERP) workshop, co-located with European Conference on Information Retrieval (ECIR), 2017, Aberdeen, United Kingdom.
- **Invited talks:**
  - European Commission Joint Research Center (JRC), 2016, Ispra, Italy.
  - UNESCO: United Nations Educational, Scientific and Cultural Organization workshop on Crowdsourcing tools, 2015, Geneva, Switzerland.
  - Data Science workshop organized by the Higher Education Commission (HEC) Pakistan, Islamabad, 2017.
  - International Conference on Innovative Computing (ICIC), 2016, Lahore, Pakistan.
  - Machine Learning and Data Analytics Symposium (MLDAS), 2014, Doha, Qatar.
  - Global Entrepreneurship Week, Qatar Science and Technology Park, 2015, Doha, Qatar.
  - SeCO Workshop on Search Computing, 2010, Como, Milan, Italy.
- **Editor to special issues:**
  - International Journal of Human-Computer Interaction (IJHCI) special Issue on Social Media in Crisis Management, 2017.
  - Journal Information Systems Frontiers special Issue on Exploitation of Social Media for Emergency Relief and Preparedness, 2017.
- **Track Co-chair:**
  - International Conference on Information Systems for Crisis Response and Management (ISCRAM), 2015, 2016, 2017.
- **Program committee member:**
  - International AAAI Conference on Web And Social Media (ICWSM-2016, 2017)
  - International Conference on Digital Health (DH 2015, 2016, 2017)
  - 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)
  - 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 (2015)
- Information Systems Frontiers Journal (2016)
- Computer Networks Journal (2014)
- International Conference on Web Information System Engineering (WISE 2014)
- International Conference on Information Systems for Crisis Response and Management (ISCRAM 2014, 2015)
- ACM Web Science Conference (WebSci 2014)
- International Conference on Web Engineering (ICWE 2012)

**- Professional member:**

- Association for Computing Machinery (ACM) professional member since 2012
- ISCRAM community professional member since 2012
- IEEE member since 2017

**CERTIFICATIONS**

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

**TECHNICAL SKILLS**

**- Programming languages:**

- JAVA— SE, EE, EJBs (expert level)
- Web Services RESTful, SOAP (expert level)
- Python (advance level)
- R (beginner level)
- Microsoft .NET Framework using C#, ASP.NET and ADO.Net (advance level)

**- Databases:**

- Postgres
- Redis (expert level)
- Oracle 9i, 10g, 11g (expert level)
- MySQL, MS-SQL Server (advance level)

**- Misc. expertise:**

- Weka: Data Mining Software (advance level)
- Good hands on knowledge of OOP (Object Oriented Programming) and agile methodology
- Experience designing and/or developing solutions for a Service Oriented Architecture (SOA)
- Sound knowledge of 3-tier and N-tier layered architecture, and design patterns like Singleton, Factory and MVC
- Experience using tools such as NetBeans, Eclipse, Visual Studio.Net
- Experience using technologies such as Maven, BaseCamp, Pivotal Tracker, GIT



## **MENTORING**

Students mentored & co-mentored:

- Shruti Singala (2016)
  - Level: Summer intern at Qatar Computing Research Institute (QCRI)
  - Topic: Automatic detection of earthquake events from Twitter
- Mudra Patel (2016)
  - Level: Summer intern at Qatar Computing Research Institute (QCRI)
  - Topic: Automatic detection of earthquake events from Twitter
- Michele Lunelli (2010)
  - Level: Master (Laurea Magistrale) at the University of Trento
  - Co-mentor: Prof. Maurizio Marchese
  - Topic: Web crawling of Google Scholar and Microsoft Academic to extract scholarly data and scholarly metrics (h-index, g-index).
- Felix Kling (2011)
  - Level: Master (Laurea Magistrale) at the University of Trento
  - Co-mentor: Prof. Maurizio Marchese
  - Topic: Building Mashups: implementation of the front-end of the ResEval Mash project.
- Massimo Pacher (2011)
  - Level: Master (Laurea Magistrale) at the University of Trento
  - Co-mentor: Prof. Fabio Casati
  - Topic: Computation of the scholarly metrics of group of people such as research groups at universities or a research lab.
- Simone Dalcastagne (2011)
  - Level: Master (Laurea Magistrale) at the University of Trento
  - Co-mentor: Prof. Fabio Casati
  - Topic: Self-citations and other scholarly group metrics (e.g. group h-index).
- Matteo Bertoni (2013)
  - Level: Master (Laurea Magistrale) at the University of Trento
  - Co-mentor: Prof. Maurizio Marchese
  - Topic: Visualization of scholarly data: Built components for the ResEval Mash project.

## **REFERENCES**

References available upon request.