HEADING:

Title of the workshop and acronym

5TH International Workshop on Social Media Analytics for Health intelligence (SMA4H): how artificial intelligence transforms healthcare

Proposed duration (half-day or full-day)

Half-day

Workshop (co-)chair(s) name, affiliation. mailing address, and e-mail address

Carmela Comito, Institute of High Performance Computing and Networking of the Italian National Research Council (ICAR-CNR), Via Pietro Bucci, 7-11 C, Rende, Italy, carmela.comito@icar.cnr.it

Agostino Forestiero, Institute of High Performance Computing and Networking of the Italian National Research Council (ICAR-CNR), Via Pietro Bucci, 7-11 C, Rende, Italy, agostino.forestiero@icar.cnr.it

Clara Pizzuti, Institute of High Performance Computing and Networking of the Italian National Research Council (ICAR-CNR), Via Pietro Bucci, 7-11 C, Rende, Italy, clara.pizzuti@icar.cnr.it

Short CV of (co-)chair(s) including past experience in organizing workshops and/or related events

Carmela Comito, Agostino Forestiero, Clara Pizzuti organized the First, Second, Third and Fourth editions of the Workshop on Social Media Analytics for Healthcare (SMA4H), held in conjunction with Web Intelligence Conference 2018, 2019, 2020 and 2021.

Carmela Comito is a researcher at the Institute of High Performance Computing and Networking of the Italian National Research Council (ICAR-CNR), Italy. She received her Master's degree in Computer Engineering and her Ph.D. in Systems and Computer Engineering from the University of Calabria, Italy. In 2006 she was a visiting researcher at the School of Computer Science of the University of Manchester, UK, and in 2017 she was a visiting researcher at LIRMM, University of Montpellier, France. She is adjunct professor at University of Calabria. She co-authored over 80 papers in international journals, conference proceedings, and edited volumes. She served as a chair, program committee member and reviewer of several international conferences. Her research interests include big data analysis and mining, mobility mining, social network data analysis and mining, health informatics. She organized the Workshop on Social Media Analytics for Healthcare (SMA4H), held in conjunction with Web Intelligence Conference in 2018 and 2019. She organized and was program chair of the special session "Machine Learning in Health" at the 18th IEEE International Conference on Machine Learning and Applications (IEEE ICMLA-2019). She is organizer of HELPLINE 2020 'Artificial Intelligence for Health, Personalized Medicine and Wellbeing', workshop in conjunction with the 24th European Conference on Artificial Intelligence (ECAI 2020).

Agostino Forestiero received his Laurea degree and his Ph.D. degree in Computer Engineering from the University of Calabria, Italy, in 2002 and 2007, respectively. He is a researcher at the ICAR-CNR Institute, Italy, since 2010. He co-authored over 50 papers published in international journals, among which IEEE/ACM TON, IEEE TEVC and ACM TAAS, and conference proceedings. His areas of interest are big data analysis, distributed systems, multi-agent systems, cyber-physical systems and eHealth.

Clara Pizzuti received the Master's degree in Mathematics from University of Calabria, Italy, and a Ph.D in Science from the Radboud Universiteit Nijmegen, NL. She is senior researcher at the Institute

of High Performance Computing and Networking (ICAR) of the Italian National Research Council (CNR), where she leads the Smart Data and Models research laboratory. From 1995 to 2010 she was contract professor in the department of Computer Science at the University of Calabria. Her research interests include evolutionary computation, knowledge discovery in databases, data mining, data streams, bioinformatics, social network analysis and mining.

Introduction and description of the workshop topics

Social media allows users to connect, collaborate, and debate on any topic. The result is a huge volume of user-generated content, including healthcare information that, if properly mined and analyzed, could help the public and private healthcare sectors improve the quality of their products and services while reducing costs.

In the public health area, especially, physician could take a great advantage since the available huge data can be gathered faster and at a lower cost, compared to the traditional sources, mainly surveys. In fact, the pervasiveness and crowdsourcing power of social media data allow to model phenomena that was not possible before because either too expensive or outright impossible to answer, such as distribution of health information in a population, tracking health information trends over time and identifying gaps between health information supply and demand. Although most individual social media posts and messages contain little informational value, aggregation of millions of such messages can generate important knowledge.

Recently, social network data have been explored to monitor and analyze health issues with applications in disease surveillance and epidemiological studies. By far the first and most common healthcare application in social media is influenza. Seminal works have shown that the tweets can be used to track and predict influenza and detect depression. To this purpose, a variety of techniques have been proposed: starting from capturing the overall trend of a particular disease outbreak by monitoring social media, many other approaches appeared such as the ones based on linear regression, supervised machine learning and social network analysis. Other than influenza surveillance, others topics have started to be addressed, including, pharmacovigilance, user behavioral patterns, drug abuse, depression, well-being, assisted living and tracking infectious/viral disease spread.

Description of how the workshop will contribute to the field of Web Intelligence and why is related to WI-IAT 2022

Healthcare delivery is undergoing unprecedented transformation; healthcare systems worldwide continue to strive for innovative approaches all levels of care delivery. The fast-growing and vigorously dynamic trend of social media data analytics for healthcare play a crucial role in healthcare transformation.

AI and big data analytics for healthcare are both exciting and challenging as this field changes faster than most thanks to the new opportunities introduced by social media data, making possible real-time analysis, adaptations and improvements that are transforming how and where healthcare is delivered. Big data is enabling unprecedented analysis of healthcare data to understand complex relationships as part of understanding and shaping healthcare transformation. Specifically, social media networks, when combined with Big Data applications and health policymaking, enable the development of smart public health

applications that will result in high-quality health delivery and reduced costs. Examples of such application include the following ones:

- Early warnings of disease outbreaks such as seasonal influenza and pandemics.
- Broad scale disease profiling to identify predictive events and support prevention initiatives
- Patient care delivery is changing with patient participatory medicine and personalized medicine providing the means of involving patients in the design and delivery of their care
- Increase in collaborative care delivery by enabling collaboration across time and space

The goal of the workshop on Social Media Analytics for Healthcare (SMA4H) is to share and discuss recent advances in social media data analysis and mining to drive healthcare transformation through innovation. This workshop brings together individuals representing academia, public health researchers and practitioners and provides a forum for dialogue within and across different disciplines in the field of Web Intelligence: collective intelligence, data science, human-centric computing, knowledge management, network science, social network analysis, machine learning, statistical modelling, computational linguistics, epidemiology, sociology, and public health research. The workshop is an excellent opportunity to meet with colleagues and shape the future of health delivery, communication and practice.

Draft version of CFP

The fast expansion of social media in the last few years is making available an enormous and continuous stream of user-generated contents containing invaluable information that can be used to understand, in near real time, human life dynamics worldwide. These massive quantities of data could support in a wide range of medical and healthcare applications, including among others clinical trials and decision support, disease surveillance, personalized medicines and population health management. Besides, social media combines textual, temporal, geographical and network data, opening up unique opportunities to study the interplay between human mobility, social structure and disease transmission.

Artificial intelligence (AI) is changing the landscape of healthcare and modern personalized precision medicine. With the increasing availability of healthcare data and rapid progress of machine learning algorithms and analysis techniques AI is gradually enabling doctors for better diagnosis, disease surveillance, facilitating early detection, uncovering novel treatments, and creating an era of truly personalized medicine. Artificial intelligence in healthcare is going play a significant role in solving the issues like drug-interaction, false alarms, over-diagnosis, over-treatment. Moreover, AI with new technologies of IoT and Blockchain has tremendous scope for better medical treatment with data security.
The main areas of AI applications in healthcare are: providing personalized precision medicine, analysis and interpretation of radiology images, automated diagnosis, prescription preparation, clinical workflow monitoring, patient monitoring and care, discovery of new drugs, predicting the impact of gene edits, treatment protocol development, early diagnoses of diseases.

The workshop provides a venue for the AI community to promote collaborations and present and exchanges ideas, practices and advances specific to social media use in the particularly challenging area of health applications. It serves as a unique forum to discuss novel approaches to AI and big data analytics and mining methods that are applicable to social media data and may prove invaluable for health monitoring, surveillance, disease spreading and outbreaks prediction.

Although social media analytics research for health applications is still very much its infancy, it received a great attention along recent years. Several research studies appeared including, influenza surveillance, pharmacovigilance, user behavioral patterns, and tracking infectious disease spread.

The workshop solicits empirical, experimental, methodological, and theoretical research reporting original and unpublished results on social media analysis and mining on topics in the realm of healthcare and health informatics along with applications to real life situations. This can mean new models, new datasets, new algorithms, or new applications. Topics of interest include, but are not limited to:

- Personal health virtual assistant
- Early disease diagnosis and treatment prediction
- Clinical decision support in disease diagnosis and treatment
- Analysis and interpretation of radiology images
- Treatment Impact prediction
- Methods for the automatic detection and extraction of health-related concept
- Classifying and clustering of temporal health data in high dimensional spaces
- Application of deep learning methods to health data
- Novel architectures for scalable health data analysis and mining
- Community discovery and analysis
- Large-scale graph algorithms for social network analysis
- Spatio-temporal prediction of pandemics
- Methods for capturing outbreaks of infectious diseases
- Modeling the health status and well-being of individuals
- Models to predict the users' moods from social posts
- Real-time syndromic surveillance and early detection of emerging disease
- Virus spread monitoring and modelization
- Drug adversial reaction
- Detect health-related topics of discussion and events
- Drug abuse and alcoholism incidence monitoring
- Methodologies and measures to understand patterns and trends for general public health research
- Medical imaging analysis and diagnosis assistance

Short description on how the workshop will be advertised so as to ensure a sufficiently wide range of authors and high quality papers

In order to reach a major number of possible interested authors, we will advertise the workshop as follows:

- The numerous national and international colleagues and contacts of the organizers will be contacted asking them to publicize the event. To this aim we will also exploit social networks and mailing lists. For example, we plan to create a project on Research Gate and an event both in Twitter and Facebook. Moreover, we plan to use for the advertisement mailing lists like DBbworld, SocInfo, European projects mailing lists.

- The several national and international partnerships of our CNR institute will be contacted to promote the event. Among which, University of Calabria, Polytechnic University of Turin, Federal Research Center "Computer Science and Control" of the Russian Academy of Sciences, University of

Manchester, University of Chicago, INRIA, University of Montpellier (LIRMM), University of Amsterdam, University of Cambridge, University of Oxford, IBM.

- The webpage of the workshop will be optimized through a Search Engine Optimization in order to reach a lot number of people searching for topics addressed in the workshop.

- A dedicated mailing list will be created to notify the call for papers of the workshop to all major researchers working on this research area.

Expected number of participants and the expected number of submissions

AI for health domain is a widely recognized focus of attention for scholars in computer science, health informatics, biomedical engineering and related fields. This has been witnessed by a number of venues for developing and publishing studies of artificial intelligence and information systems applied to the health domain, for which the volume of data of interest is rapidly growing, also thanks to the support of Internet and online media platforms, and of the recent breakthroughs in data science, machine learning and related fields.

As for the tentative list of participants a great number of researchers in the field are potentially interested in the workshop.

As for the tentative list of participants, we are confident that attendees @ WI-IAT 2022 represent a target audience for our proposed workshop. Considering the size of the conference, as well as the widely increasing interest for the workshop theme, we expect to receive a number of submissions around 14 papers.

Tentative program committee:

Daniela Perrotta, ISI Foundation, Italy

Alessandro Vespignani, Northeastrn University, USA

Francesca Dominici, Harvard University, US

Michael J. Paul, Johns Hopkins University, US

Michele Tizzoni, ISI Foundation, Italy

Kyis Essmaeel, Université de Bourgogne

Maurizio Tesconi, ISTI-CNR, Italy

Albert Dipandà, University of Burgundy, Dijon, France

Mukaddim Pathan, University of Melbourne, Australia

Hassan Ghasemzadeh, Washington State University, US

Wenfeng Li, Wuhan University of Technology, China

Philip Kuryloski, Cornell University, Ithaca, US

Roozbeh Jafari, Texas A&M University

Mohammad Mehdi Ebadzadeh, Amirkabir University of Technology, Teheran, Iran

Mehdi Sheikhalishahi, FBK CREATE-NET and University of Trento, Italy

Marinella Petrocchi, ISTI-CNR, Italy

Andrea Calì, University of London, UK

Jean-Michel Rodriguez, IBM, France

Corrado Loglisci, University of Bari, Italy

Eugenio Cesario, ICAR-CNR, Italy

Paolo Trunfio, University of Calabria, Italy

Aron Culotta, Illinois Institute of Technology, US

Workshop/special session format planned (keynote, expected number of presented papers, invited talks, panels, demonstrations, etc.)

We plan to have a keynote speaker and 6 presented papers.

TENTATIVE INTERNAL AND EXTERNAL SCHEDULE

Submission deadline: September 25, 2022

Review deadline: October 5, 2022

Acceptance deadline: October 15, 2022

Camera ready: October 30, 2022

Program ready: November 18, 2022