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Editorial

Biomedical information through the implementation of social media environments

The fast growth of Social Media (with Web 2.0 or social networks such as blogs, podcast, wikis, Twitter, Facebook or LinkedIn being among the most well-known and used) has sparked a revolution on the Internet, changing the way that people share and exchange ideas, opinions and feelings. It has also affected how they search for health-related information, which has increased exponentially during the last few years [1]. A national survey in the USA found that 80% of Internet users looked for health information on the Internet [2], and 60% of them indicated that online health information affected their healthcare decisions [3,4]. Another survey showed that 34% of Internet users usually read the health experiences of other people in social media platforms and 25% of them watch videos about health topics [5].

Individuals search for information on the Internet and consult forums, social networks or blogs to know more about illnesses, treatments or health information in general. However, the information that is provided in this kind of social setting on the Internet is not always reliable. It is common for such information not to be supervised by experts in the domain who could validate it. For this reason, the quality of the information made available via Web 2.0 is often questionable; evaluation and validation are often necessary.

Information that is unreliable can lead to inefficiencies in the healthcare system and over- or under-use of key facilities or resources. Despite such problems, the huge amount of information that is offered via Web 2.0 could be used in a fruitful way. For example, taking into account that medical blogs include discussions about clinical cases, images, and specific health topics, knowledge mining of the information published in these environments could provide very useful insights for the diverse fields related to health care and for professionals such as physicians, biologists, pharmacologists, etc. One example of this type of application can be found in DISMON [6] where a system based on a Social Web, with the objective to improve patient care and medical diagnosis, is provided.

The implementation of shared health information platforms based on social networks can produce other interesting applications to consider. Wikis are among some of the paradigmatic tools; 42% of all Americans turn to the collaborative encyclopedia known as Wikipedia for information online [7] and it is used as a common source of health information. There are several health-related examples of this kind of platform such as Wiki Surgery [8], Healtheva [9] and Portal:Medicine [10] (based on free medical knowledge that anyone can read but only registered users may edit). These platforms are intended, in part, to generate new medical knowledge or its validation through "collective intelligence". Social networks such as Patientlikeme.com and general Web 2.0 tools can promote the empowerment of patients by making them more informed and, at the same time, may be used to identify subjects for recruitment in clinical trials, overcoming the frequent obstacle of achieving the required number of participants when conducting human subject research [11,12]. Social media can also be used as a tool to gather information to improve surveillance of diseases and pharmacovigilance.

Finally, electronic health records (EHRs) may play a key role in providing and sharing information between individuals and healthcare professionals. In fact, the final report of the Semantic Health Project [13] identified the need to link the data of EHRs with educational contents to support the training of both professionals and patients. The inclusion of Web 2.0 environments in such a framework represents a useful trend, and the future confluence of social networks and EHRs will open new ways to manage diseases and treatments [14].

The aim of this special section in the *Journal of Biomedical Informatics* is to bring together researchers with a common interest in the design of methods and implementation of tools that are intended to be applied in the context of social environments, seeking to create biomedical systems that exploit these techniques as well as information that is available on the Internet. Our original Call for Papers led to the submission of twelve research papers of which six were ultimately accepted for publication. The contributions were selected based on their innovation and quality, demonstrating applicability and importance in the field.

In the first paper, Merolli et al have reviewed what we know regarding the health outcomes and related effects of the use of social media [15]. The authors note that only a limited number of studies have investigated the potential of social media in chronic diseases. However, those that have been published indicate a clear positive impact on health status with no studies indicating adverse events. In addition, they indicate that "the studies covered a very limited range of social media platforms and that there is an ongoing propensity towards reporting investigations of earlier social platforms, such as online support groups (OSG), discussion forums and message boards".

In the second contribution, Lorenzi et al provide recommendations for the design, evaluation and implementation of social support in online communities, networks and groups [16]. These recommendations aim to address the interdependencies that exist between online and real-world support and emphasize an inclusive framework of interpersonal and community-based support. The applications of the recommendations proposed by the authors are illustrated through a discussion of online support for cancer survivors.

In the third paper, Martinez-Garcia et al present the development of a tool for collaborative work among health professionals for multi-morbidity patient care [17]. The paper describes an

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architecture that allows the inclusion of decision-support functionalities in a social network tool to enable the adoption of shared decisions among health professionals from different care levels. The authors indicate that this research is part of the first stage of their project, describing the results obtained in a pilot study on the acceptance and use of the social network module.

In the fourth contribution, Cameron et al describes a semantic platform called PREDOSE (PREscription Drug abuse Online Surveillance and Epidemiology), designed to facilitate the epidemiologic study of prescription drug abuse practices through the use of social media [18]. The system uses web forum posts and domain knowledge to facilitate the extraction of semantic information from user-generated content. A combination of lexical, pattern-based and semantic-based techniques are used together to extract fine-grained semantic information from the content generated by the users.

In the fifth paper, Huh et al note that patients increasingly visit online communities to get help on managing health [19]. The large scale of these communities makes it impossible for the moderators to engage in all the conversations. This work explores low-cost text classification methods applied in this domain to determine whether a thread in an online health forum needs the moderator's help.

Finally, Subirats et al present a social-network platform that supports multicenter studies using standard indicators in a distributed way, with the aim of helping people with disabilities of neurological origin as well as their relatives, health professionals, therapists, careers and institutions [20]. The authors also aim to inform patients more effectively, thereby facilitating the decision-making process, promoting knowledge democratization and user empowerment.

The papers presented in this special section help us to understand better the current interest, applications, and use of social media environments in health care. We anticipate that readers of these papers will have a better appreciation of the potential influence of social media in decision making, the diverse characteristics that may shape the management of social networks, the relationship of such networks to participatory and personalized medicine, and the importance of doing further research in this field.

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