Introduction to the Workshop on Computational Health Science

Sherry Emery
Institute for Health Research and Policy
Health Media Collaboratory
University of Illinois at Chicago (MC 275)
528 Westside Research Office Bldg
1747 West Roosevelt Road
Chicago, IL 60608
slemer@uic.edu

Christophe Giraud-Carrier
Department of Computer Science
Computational Health Science Collaborative
Brigham Young University
3361 TMCB
Provo, UT 84602
cgc@cs.byu.edu

ABSTRACT
This short paper introduces the rationale for a workshop on computational health science, and provides a brief overview of the workshop’s content. We point out some of the recent research on mining social media data for health, define what we mean by computational health science, and argue the value of meaningful multi-disciplinary collaboration.

Categories and Subject Descriptors
J.3 [Health]: Medical Information Systems—Health IT, Behavioral Health; H.4 [Information Systems Applications]: Miscellaneous

General Terms
Workshop, Health Science, Computing

Keywords
Computational Health Science, Multidisciplinary Research

1. MOTIVATION AND RATIONALE
Recognizing the usefulness of online data for public health related purposes, researchers have become more engaged in using computational modeling to better understand health and health behavior. Indeed, computer science expertise is essential for mining large amounts of online information. Reality mining is one example of how these powerful computational tools can be applied to understanding users of technology. Pentland et al. [28] have noted that users make daily digital transactions through their use of technology. These transactions “leave digital breadcrumbs — tiny records of our daily experiences” that, when mined and analyzed, can provide insight into health behavior and health outcomes. In addition, increased use of mobile communication devices linked to the Internet and social media applications have led to new health care innovations. mHealth represents a new form of health care delivery and treatment where patients are able to interact with their health care providers through mobile devices — providing additional “bread crumbs” for studying/mining health behaviors and health outcomes [11].

While some authors have expressed concerns about the use of social media in public health (e.g., see [10]), an increasing number of researchers have been quick to point out the novel opportunities offered by social media to complement (and in some cases, partially replace) existing practices in health administration, communication and surveillance [9, 13, 18, 23], and a number of recent studies have demonstrated the value of online information in understanding public health problems and their determinants. Using information obtained on trends in Internet searches, researchers have predicted outbreaks of influenza [12, 14, 29], listeriosis from contaminated foods [34], gastroenteritis and chickenpox [27], and interest in alternative tobacco products and quitting smoking following an increase in the federal cigarette excise tax [3, 4, 20]. Social media applications such as Facebook, Twitter and YouTube have helped engage, connect, and mobilize individuals as they freely interact and share content in online communities. Recognizing the wealth of information generated by users through their participation with social media, researchers have begun tapping or mining this information to gain a better understanding of health outcomes and even health behavior. For example, Corley et al. [8] mined text data in the blogosphere for “influenza” and “flu.” Their findings revealed trends in posts about the flu that were consistent with reports from the Centers for Disease Control and Prevention (CDC). Several studies have mined YouTube content for information relative to anti-smoking video communities [6], immunizations [21], H1N1 influenza pandemic [25], quitting smoking [5], cardiopulmonary resuscitation [24], kidney stones [31], and prostate cancer [32]. Similarly, Twitter has been shown to provide a means of sharing information on a variety of health-related conditions (e.g., [26, 30]). A number of studies have mined Twitter to understand problem drinking [33], detect flu epidemics [1, 2, 7], classify dental pain messages [17], analyze infectious diseases and their associated symptoms [22], track suicide [19], gain insight in prescription drug abuse [15, 16], and predict heart disease mortality [9].
Computational Health Science (CHS), as we define it, represents the application of innovative computer science tools, including social media and data mining, to address health-related questions and problems. It integrates the analytical strengths and skills of health scientists and computer scientists, supported by complementary expertise from other researchers and practitioners as applicable (e.g., psychologists, sociologists). The goal of CHS is to better understand how technology can affect human interactions and enhance supporting environments by conducting innovative research that will inform future practice directed at changing health behavior through improved surveillance, communication, networking and targeted intervention.

One of the biggest challenges within the emerging field of CHS is establishing a shared vocabulary and understanding of methodological approaches used both in computer science and health research. The goal of this workshop is twofold:

1. To feature innovative and emerging CHS research, fostering constructive and critical dialogue, and
2. To lay a foundational framework and vocabulary that will encourage and enhance collaborations between computational and health researchers.

The workshop, therefore, is aimed at computer scientists with an interest in leveraging computational techniques to tackle complex health issues.

2. ORGANIZING COMMITTEE

We are most grateful to the able and supportive members of our program committee, who assisted with dissemination and review of submitted papers:

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- Jérôme Azé, LIRMM, France
- Michael Barnes, Brigham Young University, USA
- Michael Chary, Mt. Sinai Hospital, USA
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- Henry Kautz, University of Rochester, USA
- Sudha Ram, University of Arizona, USA
- John Yen, Pennsylvania State University, USA

3. CONCLUSION

There have been and continue to be many instances of collaborations across the health and computing sciences. However, in most cases, these are examples of what may be regarded as interdisciplinary activities, where one group uses the expertise of another, but with only limited, if any, engagement in that other group's expertise and research agenda. There is certainly value in such endeavors. However, our vision goes far beyond. While we do not intend to discourage these interdisciplinary efforts, our hope is to foster a more truly multidisciplinary approach, one in which we create, maintain and pursue joint research agendas that allow meaningful contributions to both disciplines.

4. REFERENCES


