

“Using small data to measure, monitor, and manage health related behaviors”
Vision paper for Sensing and intervening to promote college student health
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Small data

Consider a new kind of cloud-based app that would create a picture of an individual’s life over time by continuously, securely, and privately analyzing the digital traces they generate 24x7. The social networks, search engines, mobile online games, and e-commerce sites that they access every hour of most everyday extensively use these digital traces to tailor service offerings, improve system performance, and target advertisements and content. These diverse and messy, but highly personalized, data can be analyzed to draw powerful inferences about an individual, and for that individual. **Use of applications that are fueled by these traces could enhance, and even transform the experiences of individuals (patients, students, parents), and the practice of professions (therapists, teachers, coaches).**

There are precedents for small data in emerging mobile health applications and services (<http://ginger.io> and <https://moodrhythm.com/>). The opportunities for leveraging small data is possibly the greatest in the college student population for two reasons:

1. college age students are by and large digital natives and make extensive use of digitally enabled services for both curricular and extracurricular activities
2. college age students face a hose of health and life related challenges in their transition to ‘independence’ for which assistive applications could be well suited

Student life

Students who move out of the home and transition to college life suddenly have before them the need to manage their own class and study schedules, sleep schedules, budgets, nutrition, drinking, exercise, and social interactions; and for (m)any with a chronic condition (ADHD, Depression, IBS, Migraines) add to this list medication adherence, refills and doctors visits. These are self-management skills that hopefully students began to form as young adults at home; but the transition in today’s context of 24x7 availability of food, entertainment, and socializing seems particularly daunting.

My interest is in exploring how the same technologies that intensify challenges can be turned into sources of self knowledge, self management, peer and professional support in the context of student life. The Student Life project at Dartmouth is an excellent first example of such work (<http://studentlife.cs.dartmouth.edu/>). Can we build applications for students to better:

- understand themselves
- be mindful as they make day to day choices
- seek and use social-support to establish the habits they themselves aspire to

The computing challenges in this space are threefold

- creating the algorithms that turn a combination of noisy continuous signals from an individual into actionable and insightful information
- creating the HCI techniques to engage individuals with their data through applications
- the privacy mechanisms to allow students to share how they are doing not what they are doing and to support their growing independence not hamper it

The work and community will be greatly served by development and use of a shared evolving infrastructure based on a modular architecture that accommodates open source and commercial components. Much of this can borrow from and contribute to the Open mHealth community <http://openmhealth.org>.

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Deborah is a Professor of Computer Science at Cornell Tech where she founded the Small data lab and the Jacobs Institute's Health Tech Hub (<http://destrin.smalldata.io>) (<http://tech.cornell.edu/programs/masters-programs/ms-in-is-health-tech>).

She is also a co-founder of the non-profit startup, Open mHealth and Professor of Healthcare Policy and Research at Weill Cornell Medical College. Her current focus is on mobile health and small data, leveraging the pervasiveness of mobile devices and digital interactions for health and life management. (<https://www.youtube.com/watch?v=IAEhSGYEHWU>). (<http://openmhealth.org/>)

Previously, Estrin was the founding director of the NSF-funded Science and Technology Center for Embedded Networked Sensing (CENS) at UCLA (2002-12). Her Awards include: ACM Athena Lecturer (2006) and Anita Borg Institute's Women of Vision Award for Innovation (2007). She is an elected member of the American Academy of Arts and Sciences (2007) and National Academy of Engineering (2009). (PhD, MIT (1985); BS, UCB (1980))