Healthcare Analytics
CSE 40817/60817
Professor Nitesh Chawla

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TR: 2 to 3:15 PM
http://www3.nd.edu/~cse/2013fa/40817/index.html

Professor
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Monday: 1 PM to 2:30 PM
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Reference Textbooks:

There are no required textbooks for this course. The following are for reference:
1. Biomedical Informatics: Computer Applications in Health Care and Biomedicine
   Editors: Edward Shortliffe and James Cimino
   Publisher: Springer; 3rd edition (May 25, 2006)
   ISBN-10: 0387289860
2. Clinical Prediction Models
   Author: Ewout W. Steyerberg
   Publisher: Springer; Softcover reprint of hardcover 1st ed. (Dec. 1, 2010)
   ISBN-10: 1441926488
Course Description

Healthcare is facing a digital revolution from data collection to its application in decision-making. The Affordable Care Act has a major provision for electronic health records or HER. The EHR will not only reduce the paperwork and administrative effort, but it will also lead to a reduction in costs, reduction in errors, improved and standardized data, and the meaningful use of such data will improve the quality of care (preventative medicine). With the availability of the digitized data comes the opportunity of novel large-scale analytics towards prospective healthcare --- a personalized assessment of one's health, along with a sundry of recommended lifestyle changes. Meaningful use of the electronic health care data is to not only take a giant leap towards personalized and prospective health care, but also reduce the healthcare costs by designing a better disease management strategy, leading to lifestyle adjustments and pre-emptive measures. Personalized medicine integrates genetic, genomic, and clinical information to predict a person's likelihood of developing a disease, its onset course, and potential treatment plans. The course will bring together the intersection of medicine and computational thinking for the grand challenge problems in healthcare. The course will capture the intersection of clinical informatics and public health informatics. It will not cover bioinformatics.

The students will have an opportunity to work on a variety of thematic projects with partners in hospital systems, health exchange, St. Joe County Health, Global Health, Wellness initiatives, and Smart Phones.

The class will be structured as a mix of lectures, invited speakers, case studies, and class projects. After the first few lectures on the introduction of analytics, prospective healthcare, data and personalized and prospective healthcare, the students will be presented with various themes for conducting their case study or class projects in. The students are also welcome to suggest themes. Each student will assign to a theme and there will be a limit of 6 students per theme. Once we settle on the themes, the rest of the class will be dedicated on distributing lectures on each of the themes.

Goals

• Understand the role of data and computational thinking in prospective healthcare
• Understand basic concepts of analytics (data mining) and informatics as relevant for healthcare
• Become familiar with the Electronic Health Record and other sources of data
• Become familiar with wellness initiatives and projects, as well as role of social media and smart phones
• Awareness and discussion of ethical and privacy issues in Healthcare
• Conduct an independent case study on a thematic topic in Healthcare Analytics
• Implement a team-based class project
Grading

Assignments: 20%
Assignments will include review of material, paper-based, as well as data analysis. Any assignment requiring programming will pair non-CS students with CS students.

Quizzes: 20%

Case Study (report and presentation): 15%
Students will work in groups on creating a thorough case study on a theme of Healthcare Informatics/Analytics. The topics/themes can include (but not limited to): IT for healthcare; analytic methods; genomic data; rare diseases; global health; smart phones in healthcare; start-ups in the healthcare/wellness domains; role of social media; privacy/societal issues and healthcare policy.

Class Project: 40%
A major chunk of the semester will be focused on class project, where the students will focus on developing and implementing a focused initiative in topical theme that is identified during the course (within the first four weeks of the class). The suggested topics for case study are also applicable to class project. The class project will involve a formal proposal, a design presentation in class around the aspects of the project (identifying data, technology, literature), milestone reports, and final paper and project presentations.

Participation: 5%
Various in-class exercises will be conducted during the semester that will contribute to participation.

Late Policy:
Assignments submitted within the hour after the submission deadline will be forfeited of 10% of the grade. Assignments submitted thereafter will be forfeited of 33% of their grade for each day of delay (0 after 3 days after submission deadline).

Academic dishonesty:
The CSE and the du lac honor code will be strictly followed. All assignments are individual unless instructed. You can discuss the assignment at a high level, but you should independently and individually write down the answers and/or the program. The key is that you should be able to explain the concept if asked. The sharing and copying of homework solutions or programs or functions or exams will be considered cheating. All the references and sources should be carefully provided and cited.

(The syllabus is subject to change, and will be updated on class webpage.)