Teaching

AI Health

Spring 2020

Course Information

Course Date and Time: Thursday 12:00-3:00PM
Location: UTA 1.204
Instructor: Ying Ding
Office Hour: Thursday 10-11:45AM, or by appointment

Course Description

Recently, the U.S. healthcare industry has surpassed manufacturing and retail to become the largest employer in the country, with every 1 out of 8 Americans working in this sector. Policies and incentives have been established to promote IT in health to improve care and delivery. In this course, we will explore the major components of health IT systems, ranging from data semantics (ICD10), data interoperability (FHIR), diagnosis code (SNOMED CT), to workflow in clinical decision support systems. After establishing the good understanding of the fundamentals of health IT systems, we will dive deep into how AI innovations (e.g., machine learning, deep learning, computer vision) are transforming our healthcare system by introducing new concepts of mobile health, AI diagnosis, AI medicine, smart device, and intelligent delivery. This course will offer hands-on tutorials based on the real-world Electronic Health Record (EHR) data from MIMIC III (https://mimic.physionet.org/) released by MIT Critical Data. MIMIC-III (Medical Information Mart for Intensive Care III) contains de-identified health information from over forty thousand patients who stayed in critical care units of the Beth Israel Deaconess Medical Center between 2001 and 2012. These tutorials aim to enhance data search and analytics skills by providing practices related to database search, natural language processing, data visualization, machine learning, and deep learning. In this course, we will enhance the group learning experience and learning by doing, therefore, there will be many class activities. This course is designed for everyone, so no tech or programming background is required or desired.

Course Objectives

After attending this course, you should be able to achieve the following goals:

- Be aware of current healthcare initiatives to deliver quality care
- Understand the basic technologies of health IT systems including data semantics, data interoperability, workflow, and diagnosis
- Be familiar with electronic health record systems (EHR systems)
- Gain the overview of AI innovations in healthcare
- Master practical skills of data search and analytics including database search, natural language processing, data visualization, machine learning, and deep learning

Calendar

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
<th>Class Activity</th>
<th>Lab/Tutorial</th>
<th>Notes</th>
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作业和评分

**个体作业 (45%)**

1. 案例报告 (5%): 找到一个与AI健康相关的案例，描述这个案例的详细情况，并列出你的想法和批评。
2. 写关于你的英雄 (5%): 确定一个在医疗领域工作的专业人士，阅读至少3篇他的/她的作品，总结他的工作，你的想法，你是否建议他/她作为我们的客座演讲者。如果他/她决定来，你可以做采访，作为他/她的演讲前。
3. 市场报告 (5%): (例如，慢性病管理，远程医疗，EMR企业门户，智能医疗设备，医疗聊天机器人，智能诊断，生活方式和健康，智能医疗应用程序，医院管理系统，健康保险等) 包括：玩家列表，市场总结，商业模式，产品评论，优点和缺点，你的商业智能关于这个领域。
4. NLP教程 (10%): 生成一个使用MIMIC数据集的NLP教程（幻灯片，代码，视频）。
5. ML/DL教程 (10%): 生成一个使用MIMIC数据集的ML/DL教程（幻灯片，代码，视频）。
6. 数据可视化教程 (10%): 生成一个使用MIMIC数据集的数据可视化教程（幻灯片，代码，视频）。

**团体制作 (15%)：**

Appendix II: Market intelligence; Appendix III: Case Studies

- 2. Group Project (30%): Build evidence-based care apps/tools,
  
  - joining AI Health Data Challenge
  - using MIMIC datasets
  - data+design
  - a 3-5 page report (aiming for a workshop paper), powerpoint, demo, code, and video (assuming that you will teach it to other students), presentation

Class presentations, participations, and final presentation, book chapters (10%).

**Grading Guideline**

Your written, web-based, and oral work will be evaluated according to four criteria; it must:

- Be clearly written, marked up, and/or presented, and checked for spelling and grammar;
- Demonstrate a degree of insight into the concepts, issues, and trends in both the areas you investigate in the assignments and in the course content;
- Demonstrate a degree of originality in your reviews, analyses and projects; and
- Display familiarity with the appropriate literature.

To receive a passing grade in this course, you must turn in all of the assignments and the term project and complete all the presentations. You cannot pass this course without doing all of the assigned work (which includes the final presentation), however, turning in all of the work is not a guarantee that you will pass the course.

Borderline grades will be decided (up or down) on the basis of class contributions and participation throughout the semester.

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<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>Outstanding achievement. Student performance demonstrates full command of the course materials and evinces a high level of originality and/or creativity that far surpasses course expectations.</td>
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<tr>
<td>A-</td>
<td>Excellent achievement. Student performance demonstrates thorough knowledge of the course materials and exceeds course expectations by completing all requirements in a superior manner.</td>
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<tr>
<td>B+</td>
<td>Very good work. Student performance demonstrates above-average comprehension of the course materials and exceeds course expectations on all tasks as defined in the course syllabus.</td>
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<tr>
<td>B</td>
<td>Student performance meets designated course expectations and demonstrates understanding of the course materials at an acceptable level.</td>
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<tr>
<td>B-</td>
<td>Marginal work. Student performance demonstrates incomplete understanding of course materials.</td>
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<tr>
<td>C+</td>
<td>Unsatisfactory work. Student performance demonstrates incomplete and inadequate understanding of course materials.</td>
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<td>C</td>
<td>2.0</td>
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<tr>
<td>C-</td>
<td>1.7</td>
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<tr>
<td>D+</td>
<td>1.3 Unacceptable work. Coursework performed at this level will not count toward the MLS or MIS degree. For the course to count toward the degree, the student must repeat the course with a passing grade.</td>
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<tr>
<td>D</td>
<td>1.0</td>
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<tr>
<td>D-</td>
<td>0.7</td>
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<tr>
<td>F</td>
<td>0.0 Failing. Student may continue in program only with permission of the Dean.</td>
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