Artificial Intelligence in Biomedical Informatics

ICS 691 - Special Topics in Computer Science, Sec. 002

Spring 2012 (CRN: 89437)

Course Description: This course gives students an overview of Artificial Intelligence (AI) techniques used in medicine and biology. Practical applications of AI in biomedical informatics range from decision support systems for diagnosis to modeling physiologic processes, to analyzing human and animal DNA. Students in the course gain an in-depth practical experience by designing and completing a course project on a topic they choose.

Lectures are on Mon and Wed, 10:30-11:45am in 003G Hamilton Library (lower level). Credits: 3.

References: Required text: **Biomedical Informatics: Computer Applications in Health Care and Biomedicine**, *Edward H. Shortliffe and James J. Cimino (Editors)* 3rd Edition, Springer, 2006, ISBN-10: 0387289860, ISBN-13: 978-0387289861.Additional material: Selected papers from journals (e.g. Artificial Intelligence in Medicine, the Journal of the American Medical Informatics Association) and conferences/workshops (e.g. AMIA, IJCAI, AAAI).

Prerequisites: Some programming experience in one or more languages is needed. Experience in artificial intelligence and/or biomedical applications is useful, but not required.

Course Objectives: The student should understand the fundamental concepts needed to apply Artificial Intelligence in Medical or Biological domains, including (i) how to encode biomedical knowledge so it is machine understandable (knowledge representation) (ii) what inferencing methods have been or could be used in biomedical domains (reasoning methods), (iii) the principles of designing software systems to solve problems in biomedicine (e.g. designing a new system), and (iv) gain an in-depth understanding of current research in Biomedical Informatics.
At the end of the course, students should be able to decide if a non-trivial problem can be solved effectively using existing biomedical informatics methods, and if so, design and possibly implement a prototype system to solve the problem.

Term Project: The term project may be done individually or in a group. It can consist of a literature review, collection, representation or analysis of data, a programming project, or a combination of the above A programming project usually involves the development or modification, testing, or evaluation of one or more software applications in an area of Medicine or Biology of your choice.

Grading: Grades are based on the completion of a term project (75%) and your presentation of research papers to the class and active participation in class discussions (25%). The term project includes a written proposal, a progress report, a list of references, and a final project report, as well as oral mini, progress and final project presentations to the class.

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