



香港中文大學  
The Chinese University of Hong Kong

Institute of Theoretical Computer Science and Communications

*ITCSC-CSE Joint Seminar*

## Computational Medicine and Health Care

By

**Prof. Danny Z. Chen**

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***December 20, 2016, Tuesday***

***4:30 pm – 5:30 pm***

***Room ERB1009 William M. W. Mong Engineering Building,  
The Chinese University of Hong Kong***

### Abstract:

Computer technology plays a vital role in modern medicine, health care, and life sciences, especially in medical imaging, human genome studies, clinical diagnosis and prognosis, treatment planning and optimization, and medical data management and analysis. As computer technology continues to evolve, computer science research and development will inevitably become an integral part of modern medicine and health care. Computational research and applications on modeling, formulating, and solving core problems in medicine and health care are not only crucially needed, but are actually indispensable! The new area of computational medicine and health care is emerging in response to this critical need of our time.

In this talk, we present a set of important computational problems and approaches in modern medical research, clinical practice, and applications. In particular, we discuss computational problems that arise in medical imaging, clinical diagnosis and prognosis, basic medical research, and other medical applications. These include identification and distribution analysis of immune cells (for the diagnosis and prognosis of breast cancer, inflammation diseases, and auto-immune diseases, and in stem cell studies of leukemia bone marrow micro-environments), medical imaging for cancer detection and research, motion tracking of massive swarming bacteria in image movies, etc. We demonstrate new models for formulating key medical tasks as computational problems, and devise effective approaches for solving them, based on combinations of techniques in computer vision, data mining, and optimization. In particular, we present new computational approaches for medical problems based on the emerging powerful framework of deep learning. Also, we show experimental data and results to illustrate the clinical applications of our approaches. Finally, we highlight some important future research trends and problems in the exciting new area of computational medicine and health care.

### Biography:

Prof. Danny Z. Chen( 陳子儀 )received the B.S. degrees in Computer Science and in Mathematics from University of San Francisco, California, US in 1985, and the M.S. and Ph.D. degrees in Computer Science from Purdue University, West Lafayette, Indiana, US in 1988 and 1992, respectively. He has been on the faculty of the Department of Computer Science and Engineering at University of Notre Dame, Indiana, US since 1992, and is currently a Professor. Prof. Chen's main research interests are in computational medicine, medical imaging, computational geometry, algorithms and data structures, computer vision, data mining, and VLSI. He has published many journal and conference papers in these areas, and holds 5 US patents for technology development in computer science and engineering and medical applications. Prof. Chen is a Fellow of IEEE and a Distinguished Scientist of ACM. He received the CAREER Award of the US National Science Foundation (NSF) in 1996, the James A. Burns Award for Graduate Education of University of Notre Dame in 2009, and a Laureate Award in the 2011 Computerworld Honors Program for his work on developing "Arc-Modulated Radiation Therapy" (a new radiation cancer treatment approach).

\*\*\*\*\* ALL ARE WELCOME \*\*\*\*\*