COMPUTER SCIENCE COLLOQUIUM

Evolutionary Algorithms for Finding Optimum Experimental Designs with Biomedical Applications

SPEAKER **Prof Weng Kee WONG**

Professor of Biostatistics
Department of Biostatistics
University of California at Los Angeles
USA

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TIME 10:30 am - 11:30 am

VENUE G7315, 7th Floor, Green Zone
Yeung Kin Man Academic Building
City University of Hong Kong
83 Tat Chee Avenue
Kowloon Tong

ABSTRACT

We develop a nature-inspired metaheuristic algorithm and call it discrete particle swarm optimization (DPSO) to find extended two-stage adaptive optimal designs for phase II trials with many parameters. These designs include Simon's design (1989) and those proposed by Lin and Shih (2004) as special cases. We show that DPSO not only frequently outperforms greedy algorithms, which are currently used to find such designs when there are only a few parameters; it is also capable of effectively solving adaptive design problems with many parameters that greedy algorithms cannot. Specifically, we consider situations where a treatment seems promising in stage 1 but there is great uncertainty in its efficacy rate, and drug development cost and ethics require that there be multiple pre-determined user-specified efficiency rates for possible testing at stage 2 given testing error rates. We provide a real application and show benefits of the proposed strategy for designing a Phase II trial. The talk will also cover applications of other metaheuristic algorithms, like Differential Evolutionary, Cuckoo and Imperialist Competitive algorithms to find different types of optimal experimental designs.

BIOGRAPHY

Professor Wong received his PhD in statistics from the University of Minnesota in 1990. His main area of research is in optimal design of experiments with applications to the biomedical sciences. He received, as principal investigator, multiple R01 grants from the National Institutes of Health for his innovative work in design. Professor Wong has also worked on various biomedical research projects supported by the National Institutes of Health, Federal Drug Administration, Centers for Disease Control and Prevention, National Cancer Institute, Robert Wood Foundation, Scleroderma Foundation and Lupus Foundation of America. His current interest is in use of nature-inspired metaheuristic algorithms to tackle high-dimensional and complex optimal design problems.

Professor Wong is currently associate editor of several statistical journals and was a scientific advisor for a six-month design conference at the Isaac Newton Institute for Mathematical Sciences in Cambridge, England. He is a fellow of the Institute of Mathematical Statistics, fellow of the American Statistical Association, an elected member of the International Statistical Institute and a fellow of the American Association for the Advancement of Science.

All are welcome!

In case of questions, please contact Prof K C TAN at Tel: 3442 8504, E-mail: kaytan@cityu.edu.hk, or visit the CS Departmental Seminar Web at http://www.cs.cityu.edu.hk/.