Nature-inspired meta-heuristic algorithms for generating optimal designs

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This talk gives a brief overview of nature-inspired meta-heuristic algorithms for solving general optimization problems. I focus on their applications to find various types of optimal continuous designs for dose response nonlinear models and in factor screening studies. I discuss a couple of these algorithms and highlight advantages and differences between such algorithms and conventional algorithms commonly used in the literature. Using particle swarm optimization techniques as a key example, I demonstrate its ease, versatility and speed in finding different types of optimal designs, including optimal designs under a minimax or maximin criterion. For some of these design problems, the optimization problem may involve a hundred variables or more. A concrete application to design a dose response model for a pharmaceutical trial will be presented.