

NATURE-INSPIRED METAHEURISTIC ALGORITHMS FOR FINDING EFFICIENT EXPERIMENTAL DESIGNS

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Optimal design theory and ideas are increasingly applied to many research disciplines. I present a brief overview of optimal design methodology along with its statistical foundation in the context of dose response studies.

Particle swarm optimization (PSO) is then introduced to find optimal designs for potentially any model and any criterion. The method works quite magically and frequently finds the optimal solution or a nearly optimal solution after a few iterations. There is virtually no assumption required for the method to perform well and the user only needs to input a few easy to work with tuning parameters. Using several popular models in the biological sciences, I demonstrate how PSO can find different kinds of optimal designs quickly, including mini-max types of optimal designs where effective algorithms to find such designs have remained elusive until now.