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Using Animal Instincts to Find Efficient Experimental Designs

I first present a brief overview of optimal design methodology. Particle swarm optimization (PSO) is then introduced to find optimal designs for potentially any model and any design criterion. The method works quite magically and frequently finds the optimal design or a nearly optimal design in an efficient way. There is virtually no explicit assumption required for the method to perform well and the user only needs to input a few easy tuning parameters in the PSO algorithm.

Using models from the biopharmaceutical sciences as examples, I demonstrate how PSO searches for different types of optimal experimental designs in dose response studies, including mini-max types of optimal designs where effective algorithms to find such designs have remained elusive until now.