

Dear Editor,

We would like to submit the article, "ICAOD: An R Package for Finding Optimal designs for Nonlinear Statistical Models by Imperialist Competitive Algorithm," to *The R Journal*.

Optimal designs, which determine the number of experimental points to observe the responses, the design points and the number of replications at each design point, are increasingly and widely used in many different disciplines to reduce experimental costs. Nevertheless, very few free and effective computing tools have been developed to identify different types of optimal designs for a nonlinear model, especially when is not differentiable. Thus, we here introduce an R package ICAOD to find optimal designs for nonlinear models, including locally, minimax and Bayesian optimal designs. The main computational tool for ICAOD is a novel metaheuristic algorithm called imperialist competitive algorithm (ICA) and inspired by socio-political behavior of humans and colonialism.

We believe that this ICAOD package is the first single self-contained statistical package that presents a framework to find locally, minimax and Bayesian optimal designs for nonlinear models. In particular, ICAOD offers different design approaches for handling the parameter dependency in the information matrix when the model is nonlinear. A useful feature of the ICAOD package is that it can create the Fisher information matrices for a very general class of nonlinear models automatically and also includes useful theory-based tools to assess proximity of any design to the optimal design without knowing the latter. Using ICAOD, it is also possible to find optimal designs for a user-specified optimality criterion, including hard-to-find various types of minimax optimal designs for which the criterion is not differentiable.

We presented examples in this paper to show the functionality of the package. We hope that the generality and simplicity of the ICAOD package will encourage researchers from different disciplines to explore optimal design ideas in their work and enable them to implement a more informed design to realize maximum statistical efficiency at minimal cost.

The scope of this article might fit well to *The R Journal*. We hope *The R Journal* can provide us a fair review on this work. Please contact us if you have more requests.

Yours truly,

Seongho Kim, PhD  
*Associate Professor*  
Biostatistics Core  
Karmanos Cancer Institute  
Department of Oncology  
Wayne State University School of Medicine  
Detroit, MI 48201  
Email: [kimse@karmanos.org](mailto:kimse@karmanos.org) | Phone: +1-313-576-8653