

Response-adaptive designs based on the Ehrenfest urn

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SUMMARY

Response driven adaptive designs have received an increasing interest in the statistical literature due to their applications in industry, economics, medicine, etc. But it is in the framework of clinical trials where they have known their maximum development, see, for instance, [1]. Under a response adaptive design the last patient is randomly allocated to a treatment using the previous information, that is, the previous responses and allocations of patients. In this way, some ethical goals can be achieved, skewing the number of allocations to the treatment which is showing the best performance, and preserving, to some extent, the randomness of the allocations. Urns appear as an appropriate probabilistic tool to model this kind of designs.

In this paper we describe a family of response-adaptive designs based on the Ehrenfest urn model, where the previous responses of patients are used in the transition probabilities of the urn, and therefore in the next allocation. We study some operating characteristics of these designs, such as the power of the usual inferential tests, the variability of the proportion of allocations, the expected failure rate or the target allocation and we compare them with other well-known response-adaptive designs.

Keywords: Response-adaptive designs, Ehrenfest urn.

AMS Classification: 60C05, 60F05

References

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