HAPHAZARD INTENTIONAL ALLOCATION AND RERANDOMIZATION TO IMPROVE COVARIATE BALANCE IN EXPERIMENTS

Marcelo S. Lauretto[1], Rafael B. Stern[2],
Kari Lock Morgan[3], M. H. Clark[4], Julio M. Stern[1]
(1) Universidade de São Paulo
(2) Universidade Federal de São Carlos
(3) Penn State University
(4) University of Central Florida
(jmstern@hotmail.com)

Abstract

In randomized experiments, a single random allocation can yield groups that differ meaningfully with respect to a given covariate. Furthermore, it is unfeasible to control the allocation with respect to a moderate number of covariates. As a response to this problem, Morgan and Rubin [1, 2] proposed an approach based on rerandomization to ensure that the final allocation obtained is balanced. However, despite the success of the Rerandomization method, it has an exponential computational cost in the number of covariates, for fixed balance constraints. Here, we propose the use of *Hapzard Intentional Allocation*, an alternative allocation method based on optimal balance of the covariates extended by random noise, see Lauretto et al [3]. Our proposed method can be divided into a randomization and an optimization step. The randomization step consists of creating new (artificial) covariates according a specified distribution. The optimization step consists of finding the allocation that minimizes a linear combination of the imbalance in the original covariates and the imbalance in the artificial covariates. Numerical experiments on real and simulated data show a remarkable superiority of Haphazard Intentional Allocation over the Rerandomization method, both in terms of balance between groups and in terms of inference power.

References:

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Key Words:
Haphazard Intentional Allocation; Rerandomization; Design of experiments