Effectively Selecting A Target Population for A Future Comparative Study

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Abstract

When comparing a new treatment with a control in a randomized clinical study, the treatment effect is generally assessed by evaluating a summary measure over a specific study population. The success of the trial heavily depends on the choice of such a population. In this paper, we show a systematic, effective way to identify a promising population, for which the new treatment is expected to have a desired benefit, using the data from a current study involving similar comparator treatments. Specifically, with the existing data we first create a parametric scoring system with multiple covariates to estimate subject-specific treatment differences. Using this system, we specify a level of treatment difference and create a subgroup of patients, defined as those whose estimated scores exceed this threshold. An empirically calibrated group-specific treatment difference curve across a range of threshold values is constructed. The population of patients with any desired level of treatment benefit can then be identified accordingly. To avoid any "self-serving" bias, we utilize a cross-training-evaluation method for implementing the above two-step procedure. Lastly, we show how to select the best scoring system among all competing models. The proposals are illustrated with the data from two clinical trials in treating AIDS and cardiovascular diseases. Note that if we are not interested in designing a new study for comparing similar treatments, the new procedure can also be quite useful for the management of future patients who would receive nontrivial benefits to compensate for the risk or cost of the new treatment.

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