TITLE: A Comprehensive Bayesian Double-Adjustment Approach to Dynamic Borrowing of External Data

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ABSTRACT:

Existing methods for dynamic borrowing of external data for analysis of clinical trial data only partially address compatibility of external and current trial data, looking either at the baseline or outcome differences. We propose a comprehensive Bayesian dynamic borrowing approach which calibrates both baseline and outcome differences to determine how much to borrow from external data. Our approach builds on the propensity score integrated power prior approach and utilizes the concept of elastic priors. The former addresses baseline differences in patients in external borrowing, while the latter adjusts borrowing by considering outcome differences. We construct a class of arctangent elastic functions with the predictive probability of seeing the external data given the current data as the input, which can be easily adapted to clinical input. The proposed dynamic borrowing approach will be illustrated by simulated and real data. Properties of the proposed method examined by simulation for both continuous and binary outcome scenarios will be presented.