

Wednesday 24 July 2024

16:00-17:30 Invited Session 8 (Main Room)

Combining RWD and randomized clinical trials (Chair: Nikos Demiris)

Data fusion for heterogeneous treatment effect estimation with multi-task Gaussian processes

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Bridging the gap between internal and external validity is crucial for heterogeneous treatment effect estimation. Randomised clinical trials (RCTs), favoured for their internal validity due to randomisation, often encounter challenges in generalising findings due to strict eligibility criteria. Observational studies on the other hand, provide external validity advantages through larger sample sizes but suffer from compromised internal validity due to unmeasured confounding. Motivated by these complementary characteristics, we propose a novel Bayesian nonparametric approach leveraging multi-task Gaussian processes to integrate data from both RCTs and observational studies. In particular, we introduce a parameter which quantifies the degree of borrowing and can prevent the observational dataset from dominating the estimation. Our approach outperforms state-of-the-art methods in point predictions across the covariate support of the observational study and provides a measure of uncertainty for the estimated treatment effects. We demonstrate the robust performance of our approach in diverse scenarios through multiple simulation studies and a real-world education randomised trial