



Contribution ID: 10

Type: **not specified**

Bayesian I-optimal designs for choice experiments with mixtures

Tuesday, 14 September 2021 10:40 (20 minutes)

Discrete choice experiments are frequently used to quantify consumer preferences by having respondents choose between different alternatives. Choice experiments involving mixtures of ingredients have been largely overlooked in the literature, even though many products and services can be described as mixtures of ingredients. As a consequence, little research has been done on the optimal design of choice experiments involving mixtures. The only existing research has focused on D-optimal designs, which means that an estimation-based approach was adopted. However, in experiments with mixtures, it is crucial to obtain models that yield precise predictions for any combination of ingredient proportions. This is because the goal of mixture experiments generally is to find the mixture that optimizes the respondents' utility. As a result, the I-optimality criterion is more suitable for designing choice experiments with mixtures than the D-optimality criterion because the I-optimality criterion focuses on getting precise predictions with the estimated statistical model. In this paper, we study Bayesian I-optimal designs, compare them with their Bayesian D-optimal counterparts, and show that the former designs perform substantially better than the latter in terms of the variance of the predicted utility.

Keywords

Choice experiments; I-optimality; Mixture experiment

Special/invited session

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