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Enumeration of large mixed four-and-two-level regular designs

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A protocol for a bio-assay involves a substantial number of steps that may affect the end result. To identify the influential steps, screening experiments can be employed with each step corresponding to a factor and different versions of the step corresponding to factor levels. The designs for such experiments usually include factors with two levels only. Adding a few four-level factors would allow inclusion of multi-level categorical factors or quantitative factors that may show quadratic or even higher-order effects. However, while a reliable investigation of the vast number of different factors requires designs with larger run sizes, catalogs of designs with both two-level factors and four-level factors are only available for up to 32 runs. In this presentation, we discuss the generation of such designs. We use the principles of **extension** (adding columns to an existing design to form candidate designs) and **reduction** (removing equivalent designs from the set of candidates). More specifically, we select three algorithms from the current literature for the generation of complete sets of two-level designs, adapt them to enumerate designs with both two-level and four-level factors, and compare the efficiency of the adapted algorithms for generating complete sets of non-equivalent designs. Finally, we use the most efficient method to generate a complete catalog of designs with both two-level and four-level factors for run sizes 32, 64, 128 and 256.

Keywords

Mixed-level designs, bio-assays, enumeration

Special/invited session

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