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Design of Experiments with a Ranking Response: Analysis of the Result with the Mann-Whitney Statistic

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Abstract
Product quality very often depends on organoleptic characters that are difficult to measure. As examples, let us look at the visual aspect of a vehicle dashboard, the flavour of a product, etc. During the process optimization, it's very difficult to use such responses to analyse an experimental design, because of the lack of information contained in this type of response and the problems of repeatability and reproducibility inherent in these characters. However, if it is not possible for an appraiser to provide a measure in a continuous scale, it is easier to compare various objects. In this article, we propose to use this classification to calculate a rank variable (Mann-Whitney statistic) which will be used as a numeric variable in order to exploit the results of an experimental design. Several strategies will be presented and illustrated with industrial examples

Keywords: Mann-Whitney statistic, sensory perception defects, sensory analysis, design of experiments.

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