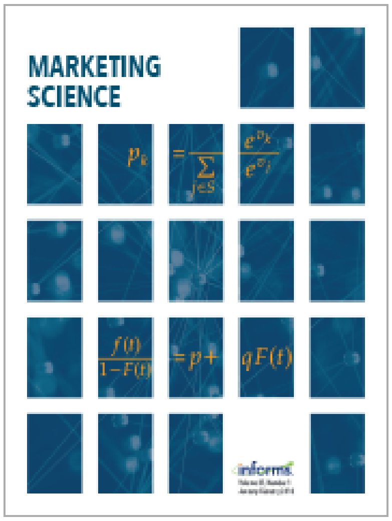

Marketing Science

Commentary

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This paper is concerned with the intriguing idea of "automatic" methods for determining those characteristics a product should have for greatest market share. The authors compare four interesting algorithms that approach the problem quite differently. Their undertaking was ambitious and well carried out; the computational effort was large and the results are presented clearly and are believable.

However, I find myself wondering if we are ready for this level of refinement. Spatial models have proven to be of great value for producing insights and for thinking about product strategies, but quantitative results with data from real respondents have often been disappointing.

The basic idea is compelling: each product is assumed to occupy a position in space, as is each respondent's "ideal point." His "liking" for a product is presumed to be related to the nearness of his ideal point to that product. But beyond this generality are important details about which little is known. Two such questions concern the estimation of ideal points and the choice of the function relating distance to preference. It seems to me that these issues require resolution before we advance to the topic of optimization:

(1) How should ideal points be estimated?

(a) If an ideal point and dimensional weights are estimated from preference data, it is common to find negative weights (unless they are constrained to be nonnegative). To accept these is to refute the underlying model. Procedures for estimating ideal points and dimensional weights simultaneously appear vulnerable to colinearity. This suggests there may be problems in quality of estimation even in those cases where negatives are not observed.

(b) If preference is assumed to be only ordinal in nature, the region in which an individual's ideal point is determined to lie can be very large. If, on the other hand, metric assumptions are made about preference, the location of an ideal point can vary dramatically depending on those assumptions.

(c) To avoid these problems, one can ask the respondent to describe his "ideal level" of each attribute, which can be mapped into an ideal point. But it seems short-sighted to use only this information and thus to ignore preference information.

(2) What should be the form of the preference function? Suppose two products and an ideal point lie on a line. If the ideal point lies midway between the products, then most would agree that preference for each should be 50%. Imagine the ideal point moving in one direction. First, as it approaches a product, preference for that product should increase. But what should happen after it passes that product?

(a) It could fall, approaching an asymptote such as 50%. The reciprocal distance function of the authors is in this category, as are functions of the form pref = $\exp(-\text{dist}^b)$, with $b < 1$.

(b) It could remain constant, depending only on the distance between products. Exponential preference functions are of this form if $b = 1$.

(c) It could continue to rise, approaching an asymptote higher than the value it has when coincident with a product. Exponential functions have this form when $b > 1$.

I am not aware of any published work answering the questions of how best to estimate respondent ideal points or what preference functions work best. These questions are particularly difficult to study because they require real, rather than simulated,

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data. The questions are basically psychological, not computational. But they are of fundamental importance, and their answers could be expected to have large effects on the models chosen in the future, and hence also on optimization procedures.

As far as model extensions are concerned, the big missing element is an integration of production cost into the model. It is really not enough to find the maximum share, because we know that's the best product at the lowest price. And you can't just handle the cost issue with constraints, which would merely set aside an arbitrary region of the space. What is needed is some way to build product cost into the objective function itself. That is really a precondition for an optimization system to be useful in the real world. That would also be a truly important achievement. So far as I know, nobody is even close.

Overall, the authors have done a first-class job of meeting the goals they set for themselves. In looking forward to their future contributions, we can hope they will also apply the same quality of effort to these additional issues.