Behavioural segmentation systems: A perspective

Received: 5th August, 2000

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Abstract Customer Segmentation is a fundamental tool in relationship marketing, providing a strategic planning framework, which allows tailoring based on differentiating pieces of data and information. There are many forms of segmentation and several techniques employed in their derivation.

This paper discusses behavioural segmentation and clustering methods specifically, which are becoming more commonly employed in the industry. Some of the beneficial applications of a behavioural solution are discussed along with the relative merits of the clustering approach compared with more exact, rule-based systems.

EXACT VERSUS CLUSTER-BASED SYSTEMS

The prevalence of database warehouses and the resultant quality and scope of customer product and transactional data have led to an increase in the development of behavioural segmentation systems using multivariate methods (such as cluster analysis).

These systems are characterised by their use of a large number of behaviour-related data fields to define a relatively small number of roughly homogeneous segments, each of which is distinct in terms of its dominant characteristics — a distinction which permits the development of segment-specific marketing strategies.

Such systems are quite different from traditional segmentation schemes which are largely intuitively (rather than data) led, and are defined in terms of very few

data fields. (Recency-Frequency-Value (RFV) systems are typical of this class.)

- Systems like RFV allow exact allocation to segments of customers who share the same values of the small number of defining fields
- Clustering systems are based on a large set of behavioural fields, and individuals within the same cluster are grouped together on similarity.

As the number of fields considered important for segmentation increases, the number of segments in an exact system increases inordinately quickly to make this approach infeasible. For example, a system based on three fields (each with, say, three values) creates 27 segments, while one with only seven fields (each with three values) creates a system with over 2,000 segments! In contrast, most

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cluster-based systems use many more than ten fields, often to create fewer than ten segments.

This highlights a severe limitation of traditional exact systems. If ten fields were indeed necessary to capture customer behaviour and only three are used (to keep the number of segments both manageable and of viable size), then, while individuals within a segment will be the *same* in terms of values on the three fields chosen, they are likely to be widely *different* on the seven behaviour dimensions ignored and so the segments cannot be regarded as behaviourally homogeneous.

It is precisely because of this limitation that clustering methods are being used more frequently — to increase the breadth of similarity of individuals in the same segment, albeit at the expense of exact likeness on a small number of characteristics.

The clustering approach, however, has its own limitations and many clients are uncertain and often nervous about how best to exploit the benefits they provide.

In this paper the author tries to illustrate the appropriate application of cluster-based systems given an appreciation of their limitations and an understanding of how they are developed.

DEVELOPMENT METHODOLOGY

To create cluster-based segments from several behavioural fields involves an analytical algorithm comprising the following eight steps.

The first step is to extract a representative sample of the customer base. The sample needs to be representative of the base to be segmented — which may mean applying a number of exclusion criteria prior to sampling. The minimum size of the sample will be determined by the

number of potential segmentation drivers to be used, the total size of the customer base, and the order of the number of segments which would constitute a viable and manageable system. (For example, for a customer base of 0.5m customers, a ten-segment solution would mean an average segment size of 50,000. The business will need to be sure that it could economically justify setting and implementing segment-specific plans for this number of people.) It should also be borne in mind that segmentation is an iterative process, and the sample size chosen in the light of the efficiency of the software and hardware being used should not preclude the ability to search for and develop a number of candidate solutions.

The second step is to review and select from the full list of behavioural data fields available. This is a joint activity between the marketer and the analyst — the marketer will have some *a priori* views about which aspects of behaviour he or she wishes to drive the segmentation and others which are not relevant to the marketing plans he or she wishes to make for this set of customers. The analyst will have an appreciation of how the values of the chosen data fields should best be handled, and will be aware of any constraints which may be imposed by the statistical procedures to be used (for example, some clustering methods may perform badly when loaded with 0-1 type variables, etc.).

The third step is to conduct a principal components analysis. This technique takes the data fields chosen as drivers for the segmentation and from them creates a set of (the same number of) variables which are mutually uncorrelated. These orthogonal components are essential if similarity between customers is to be robustly defined as the basis for clustering. This

technique also allows for the possibility of an overall reduction in the number of behavioural dimensions to be used in the clustering process, since, by construction, some of the principal components may account for very little of the information contained in the original data fields. The principal components themselves can often be easily interpreted as key behavioural factors and at this intermediate stage may provide an understanding of the nature of behavioural diversity.

The fourth step is to conduct a cluster analysis. The principal components define a Euclidean space within which each customer can be represented by a point (based on the actual data field values they have). Similarity between two customers is then defined in terms of the Euclidean distance between them. Cluster analysis will then group individuals who are 'closest together' in this space to form behavioural segments.

Using statistical diagnostics and business judgment, cluster analysis becomes an iterative procedure to deliver a good, viable and exploitable set of groups.

The fifth step is to use all available data fields to describe each of the segments comprehensively. The dominant and distinctive features of each segment are documented and summary labels based on these descriptions are created. This will enable a conceptual understanding of each of the complex groups to be used within the organisation during the planning process. The detailed profiles themselves, of course, will facilitate the formulation of specific objectives and targets. (The principal component values may themselves be included in the profiles, particularly if they can be easily and usefully interpreted.)

The sixth step is to use discriminant

analysis to develop rules for allocating customers to segments. This technique takes the actual segment allocation arising from the cluster analysis and creates a set of logical or scoring rules for the classification. This means in effect that any customer, either current (but not included in the sample used in the development), or future, may be allocated using these rules at any time using the same data fields.

The seventh step is to use the above rules to allocate all customers in the base to segments.

The eighth step is to validate the allocation rules by statistically confirming the profile of each population segment against that of the corresponding development sample segment.

USES OF BEHAVIOURAL SEGMENTATION SYSTEMS

Once developed and validated, there are three main benefits to be gained from cluster-based systems:

- a comprehensible and actionable view of a complex customer base
- a framework within which marketing objectives and strategies can be more potently derived
- a basis for measuring and tracking marketing effectiveness.

An actionable view of a complex customer base

The difficulty of obtaining a clear and actionable view of the behavioural profile of an organisation's customer base can best be appreciated by considering the extent of the possible differences in behaviour between individual customers.

Two customers may or may not hold a particular product. For an organisation with a portfolio of ten products, there

are over 1,000 different combinations of products which any customer might hold.

For any given product, transactional activity can differ between any two customers in a number of different ways. For a current account, such things as the size and numbers of credits and debits can differ, monthly average balances and the balance pattern over time can vary, as can utilisation of overdrafts, etc. For credit cards the purposes for which customers use them, or the amount and method of making monthly payments may be quite different, and so on.

Based on the changing combination of products purchased and the dynamic patterns of activity within those products, a customer's value to the organisation can change, and depending on demographic profile and life situation, *potential* value may vary between customers who may have the same actual current value.

Clearly, such diversity cannot be represented by a number of single field tables — since it is the interaction between many aspects of behaviour that gives rise to the complexity. And to hope that such complexity can be captured by a simple lifestage or RFV classification is also forlorn. Yet a cluster-based system can simultaneously take account of many of the above dimensions of behaviour, to produce a picture of a manageable number of groups of 'alike' customers.

The view the system provides is akin to the view of a rural area from the top of a mountain. The shape and density of its residential zones can be clearly made out, as can its industrial areas, and both can be distinguished from its fields and forests, but that is not to say that those fields and forests do not contain some residential or industrial properties, nor that any two properties in the same residential zone do not have different coloured front doors.

Using behavioural clusters to provide a marketing planning framework

As has been said, the clustering methodology works by identifying a number of distinct, viable and relatively homogeneous groups of customers, whose behaviour (and demography) can be understood through comprehensively detailed segment profiles.

These groups together provide a powerful framework for marketing planning, with each segment being a potentially separate focus for:

- setting segment-specific objectives
- developing strategies to advance these objectives.

Setting segment-specific objectives

The comprehensive segment descriptions deliver a thorough understanding of current (or recent historic) behaviour. To set meaningful objectives for each segment, however, additionally requires an understanding of potential to set alongside this appreciation of present behaviour.

Assessing potential behaviour (product purchasing, transactional activity, lapsing risk etc.) can be achieved to different degrees and in a number of ways depending on the availability of apposite information.

In the UK financial services sector, for example, the MORI Financial Services Research Survey and the NOP Financial Research Survey provide statistically valid and extensive information on overall market behaviour in a number of key dimensions. In doing so, they provide a benchmark against which a company may measure the behaviour of its own customers.

By using demographic fields, common to the surveys and the customer database, for example, corresponding market

Figure 1: Measuring potential

behaviour can be inferred for customers in each behavioural segment for comparison with the observed current behaviour of that group of customers (see Figure 1). A gap analysis then provides a measure of segment potential in dimensions such as specific product purchasing and supplier switching propensity.

Following this analysis the formulation of segment-specific objectives becomes a more straightforward process — with the gaps set in the context of the organisation's overall business objectives, providing the opportunities and the challenges.

In the absence of substantial external research surveys to support this sort of analysis, of course, alternative (usually less robust) approaches are sometimes used, such as:

- creating lifestyle groupings based on internal demographic fields, and intuitively assigning potential based on an understanding of the different needs of each lifestyle; then, by cross-tabulating the lifestyle and behavioural classifications, aggregating to obtain the perceived potential

within each of the behavioural segments

- directly attributing potential to the behavioural segments (again) intuitively in conjunction with any empirical information which is available
- using internally available fields to create specific views within which specific classes of objectives (such as cross-selling, retention, migration, etc.) can be explored. A cross-sell view, for example, might consist of measures such as product penetration and recent purchasing activity (which may respectively provide surrogates for potential and levels of saturation), combined to form a space onto which behavioural clusters can be mapped — to identify segments on which cross-selling effort might best be focused (see Figure 2).

From Figure 2, for example, it might be inferred that Segment A represents a better target for this product than, say, Segment D, since although both contain a substantial number of eligible customers, and both have relatively low current penetration, customers in

Figure 2: A specific product cross-selling planning view

Segment A have stronger evidence of recent purchasing of the product, which suggests the cross-sell may be easier to achieve within this segment.

Monitoring marketing performance using behavioural segments

Having set objectives (and strategies to achieve them) for each segment, using detailed segment profiles, external market data, and other constructed views, the behavioural segmentation framework provides a natural basis for monitoring and evaluation.

The objectives set will, by design, be measurable in terms of specific changes of behaviour — generally different targets for different segments. Some of the objectives, of course, may involve trying to move customers between segments (in a perceived upward direction).

There may also be the need to demonstrate in some companies, that the segmented approach itself works as an effective way of treating customers. All

of this means that ongoing measurement is essential.

- around each particular objective best practice dictates that a monitoring report template should be designed to enable the organisation to track progress during the year. The report should contain some measure of statistical confidence to provide reliable early warning if strategies and tactics are unlikely to result in the target being met by the segment. The reports should be updated monthly and changes should be related to specific marketing campaigns or other initiatives where appropriate
- segment dynamics can be tracked by reallocating customers to segments at an appropriate time interval (eg three or six months). Movements will be a reflection of marketing effectiveness, but may also highlight the effect of changes in external factors on specific aspects of behaviour which may be mirrored in particular segments more

strongly than in others. Significant volatility should be identified to statistical significance; the onus is then on the organisation to explain these changes satisfactorily, hypothesise reasons for change and/or revise their strategies for specific segments — for those organisations using behavioural segmentation for the first time, there may be a requirement to demonstrate that the approach is significantly beneficial in terms of improving marketing effectiveness. In such cases, a representative group of customers may be excluded from the behavioural segmentation and treated under the current rules for marketing planning and evaluation. A separate suite of (higher level) monitoring reports will need to be designed to evaluate this strategic test over time and to provide evidence in favour of, or against, the use of the segmentation framework going forward.

Other uses

Once implemented, with an appropriate updating mechanism in place, the behavioural segmentation system also provides an additional selection key with which to tailor customer communications, an additional data field to employ in the development of targeting models for response, attrition, etc., and an additional dimension within which to track the changing composition of the overall customer base.

ART VERSUS SCIENCE

It should be clear from the discussion above that cluster-based behavioural segmentation systems are neither definitively precise nor unique. It is necessary, therefore, to caution those

who develop or utilise such systems not to presume that they are.

With so many factors being necessary to capture, let alone explain customer behaviour, any attempt to distil the complexity into a small number of groupings will carry a cost measurable in terms of uncertainty. A small but significant perturbation, for example, to the set of data fields selected to drive the segmentation may result in a quite different set of segments.

While there are statistical controls to help evaluate the 'goodness' of any solution (in terms of intrasegment compactness and intersegment distinctness), equally important is the exploitability of the solution from a marketing perspective. Quite legitimately, therefore, there is often a trade-off between these business and statistical criteria.

The upshot of this is that, of all the analytical techniques currently used in marketing, the development of these systems most demands a close partnership between analyst and marketer, and the process can legitimately be described as an art as much as a science. There will therefore be no substitute for experience in creating such systems.

CONCLUSION

Behavioural segmentation systems are becoming increasingly important as a means of making the complexity of customer behaviour accessible to marketing planners. The scope of potential behavioural differences between two customers of the same organisation means that low-dimensional views of the customer base (such as those provided by univariate profiling and traditional exact segmentation schemes) fall unacceptably short of providing a powerful enough planning tool. The need to move away from these, of course, has been put into

sharp contrast by the increasing breadth and depth of customer databases.

Cluster-based systems provide a way forward, if their own (different) limitations are well appreciated and if they are utilised in appropriate ways.

Essentially, such systems project the fine-grain complexity at the individual customer level, to provide a 'view from above' in which dominant and exploitable similarities and differences between a manageable number of groups of customers become apparent.

At this level, and within this framework, planning to develop objectives and strategies becomes feasible. Implementation of strategies in the form of marketing campaigns/communications, occurs back 'on the ground' at the level of the individual — with customers

being selected in part on the basis of their segment membership and the agreed segment objectives, partly according to their perceived potential, and sometimes according to their specific quantified propensities.

The system also provides its own monitoring framework at the level at which specific plans have been made.

The approach needs to be contrasted with the enormity of the planning and evaluation task without such a framework, and with the inadequacy of the same activity in the context of a segmentation scheme which fails even to attempt to cope with the real complexities of customer behaviour.

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