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Clustering supermarkets: the role of experts

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Abstract

This work is part of a supermarket chain expansion study and is intended to cluster the existent outlets in order to support the evaluation of outlet performance and new outlet site location. To overcome the curse of dimensionality (a large number of attributes for a very small number of existing outlets) experts' knowledge is considered in the clustering process. Three alternative approaches are compared for this end, the experts being required to: (1) a priori: provide values for perceived dissimilarities between pairs of outlets; (2) a posteriori: evaluate results from alternative regression trees; (3) interactively: help to select base variables and evaluate results from alternative dendrograms. The later approach provided the best results according to the marketing experts.

Keywords: Clustering; External validation; Experts knowledge integration

> A supplementary exercise in cluster description involves the investigation of the clusters in order to establish whether or not they can be given substantive interpretations (…). Such substantive descriptions do not make direct use of data, but require investigators to reflect on the results of classification studies.
> Gordon (1999)

1. Introduction

As in Europe, the retail sector in Portugal is going through a restructuring phase. Several authors (e.g. Birkin et al., 2002; Dawson, 2000; Seth and Randall, 1999) identify such factors as increasing consumer mobility, increasing electronic commerce, changing household size, concentration of market power, home market saturation, and changes in planning legislation to justify the new trends in retailing. In the food retail, in particular, after an unprecedented period of hypermarkets growth, since the late 1970s, both in number and market share, it is now clear that hypermarket activity has slowed down significantly on behalf of the small or medium supermarkets (chain outlets including discount and hard discount chains) that nowadays present a larger dynamism.

In Portugal, market share data shows that since 1996 the supermarkets were the only ones to grow simultaneously in the number of outlets and in the volume of sales and, consequently, to increase the market share from 28% to 34% in the A.C. Nielsen universe. In 1997, the supermarkets reached the leadership and consolidated its expansion strategy. According to the most recent data, in 2001, supermarkets' sales were already broadly superior to the sales in hypermarkets: 47% against just 35% of the total sales of outlets with alimentary products (see Fig. 1).

This change in food outlet type is also found in other European countries (Birkin et al., 2002). Much more stringent legislation and the fact that consumers are more demanding, force the retail groups to invest in outlets of smaller dimension, and so in a proximity and quality of goods and services strategy. This investment has a longer run return as well as smaller economies of

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scale, which forces careful decision-making (McGoldrick, 2000; Salvaneschi, 1996). Because smaller outlets are heterogeneous in aspects as location, dimension, and client behaviour, the definition of outlet clusters is essential in outlet performance and site evaluation.

In Sections 2–4 the next sections, an empirical classification of variables used in measuring supermarkets performance and the role of expert knowledge in clustering and marketing applications is presented. The data collection phase is described and three approaches for experts' knowledge integration in supermarket cluster are explained. In Section 5 these approaches are compared and a cluster profiling is presented. This paper finishes with conclusions and a methodological discussion.

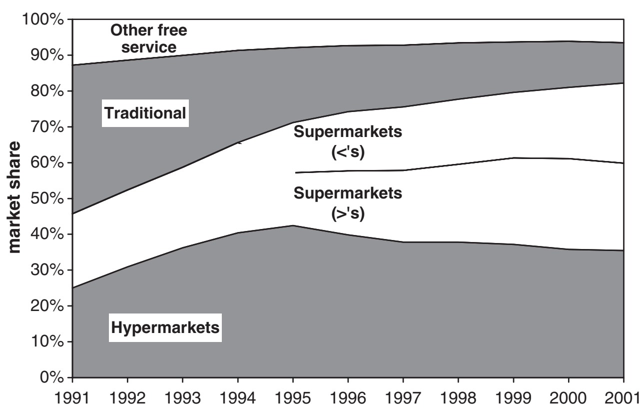

Fig. 1. Market share evolution for food outlet type in the Portuguese market. (*Source*: A.C. Nielsen Portugal).

2. Clustering supermarkets and the role of experts

This work is part of an expansion study of a supermarket chain with small and medium dimension outlets and is intended to cluster the existent outlets. The classification is not just useful to evaluate the relative performance of different locations and outlet management, but also to use in analogy forecast methods for the identification of potential site locations (Mendes and Themido, 2004). For that purpose, several performance measures and other attributes were collected in a framework defined in this section. For addressing the high dimensionality of the data, the integration of expert knowledge in the clustering of supermarkets is suggested.

2.1. Measuring supermarkets' performance

The retailers soon realized the importance of outlet location, but understanding all the aspects of outlet performance, site locations, and the consumer's behaviour, forces to collect enormous amounts of information of several types as geographical, demographic, socioeconomic and regarding competition dynamics (Wedel and Kamakura, 2000; Themido et al., 1998; Salvaneschi, 1996).

In order to organize all the data considered in location and outlet evaluation studies, an empirical classification of relevant variables is presented in Fig. 2. This framework is intended for outlet and site evaluation of small-to-medium dimension outlets belonging to a retail chain, and is based in the authors' experience

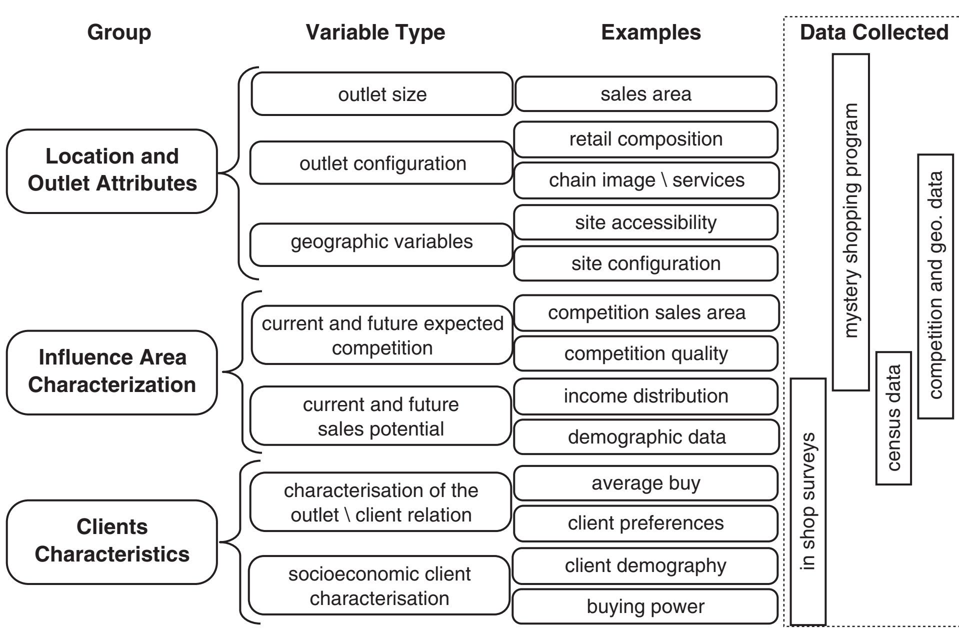

Fig. 2. Classification of assessment location and outlet evaluation explanatory variables and data collected.