BPR based on Data Mining Tools: Redesigning the Sales Promotion Process in Retailing

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Abstract

This in-progress research project involves developing data analysis tools based on statistical analysis techniques, artificial intelligence and data mining, which can be used to support decision-making in the field of retailing. During the first stages of the project, research will be carried out to determine which tools are best suited to the characteristics of this sector.

The data analysis tools developed will help distribution companies design introductory promotions in the field of retailing. We propose to innovate on the basis of process reengineering. The project’s working hypothesis is that data analysis tools can be used to design promotion processes, focusing them in such a way as to enable significant improvements to be made in customer service quality, returns on promotional actions and an increase in customer loyalty.

Different facets of information technologies have been used to promote reengineering projects. This project aims to develop data analysis techniques as an information technology which will permit corporate knowledge to be managed in such a way that the promotion process can be redesigned.

Keywords: Artificial intelligence, knowledge management, business process reengineering, sales promotions, retail industry, marketing, data mining tools, data analysis.

Introduction

Data Mining tools are mainly used in order to solve specific problems resulting from direct application of these techniques [Cabena, 1997]. In order to use them to promote innovation in business processes, we must thoroughly understand what they can do and then carefully adapt them to process requirements. Companies encounter a variety of problems in their attempts to undertake innovation projects of this sort [Miralles, 1998]. Among these problems are: the heavy financial investment in the hardware and software necessary to use a wide range of these techniques; learning the tools and fundamentals of their use; exploring a variety of options in order to discover the best alternative for their particular processes, and having reliable data to analyze. Among the specific techniques [Adriaans, 1996], now beginning to be successfully used are “Market Basket Analysis”, “Memory-Based Reasoning”, “Automatic Cluster Detection”, “Link Analysis”, “Decision Trees”, “Artificial Neural Networks” and “Genetic Algorithms” ([Berry, 1997], [Dahr, 1997], [Freitas, 1998], [Fayyad, 1996], [Groth, 1998]).

The promotion process gets underway with a manufacturers’ campaign. This usually involves deciding whether or not a promotion campaign is a good idea, taking into account previous experiences, the type of product and/or its price. Once a decision is made, the promotion is addressed to all potential customers of the supermarket chain. This can be done by distributing explanatory pamphlets in the stores’ catchment areas or by displaying posters in the stores themselves.

The ideal approach would be to target the promotion solely and exclusively at consumers who meet the objectives of the campaign. This involves deciding which consumers should be the target. In order to do this, we need to know a number of things, among them: product attributes, consumer characteristics, product-consumer relations and their evolution over time. Moreover, the offer must be personalized in order to effectively connect with individual customers ([Martínez Ribes, 1995]).

The marketing department can only meet these objectives if it has tools that facilitate proper data analysis and a methodology that guarantees correct results. Promotions can only be personalized if the chain has a customer card.

Although this set of tools will be based on data mining techniques, the project also aims to compare these techniques with multivariate data analysis techniques [Morrison 1990] in order to ensure that our techniques are user friendly for personnel not accustomed to working with statistical tools and verify the advantages obtained when the findings are interpreted.

Taking a process reengineering approach to the introduction of analysis techniques ([Davenport 1990], [Davenport 1994], [Hammer 1993], [Hammer 1995], [Hammer 1996], and [Miralles 1998]) will enable us to turn data analysis techniques into tools for improving the promotion process. The underlying idea is that any application of information technologies to business processes should make it possible to change the way these processes are carried out and achieve substantial improvements in performance ([Hammer 1993]).
Objectives

The principal objective of the project is to use Data Mining tools to improve the process of promoting products offered by a chain of supermarkets. More specifically, this objective involves:

- **Improving the promotion process’s contribution to corporate performance** through better selection, design and implementation of the chain’s promotional campaigns.

- **Increasing customer loyalty** by aligning the promotion process with the company’s strategy, focusing on its target customer segments.

- **Introducing the new process in the company** in such a way as to ensure its continuity and ongoing improvement. This objective is particularly important because these tools enhance the results of continuous improvement processes and provide feedback on results from previous promotions.

- **Analyzing the techniques which are most appropriate for each case**, so that the company can select the Data Mining tool which will best enable them to meet the three objectives listed above.

Methodology and Working Plan

Once the promotion process has been redesigned it will consist of the following stages:

1. **Estimation of returns**. Based on analysis of historical data from previous promotions, this estimate will help determine whether or not a particular sales promotion is advisable.

2. **Design of campaign**. This will involve deciding on the characteristics of the promotion campaign. These will depend on the target public selected, the time span of the actions decided upon, and the intensity of these actions.

3. Implementation. This is the campaign itself.

4. **Evaluation and supervision**. This will involve collecting information on the basis of which the campaign will be evaluated and acquiring information which will make it possible to introduce new knowledge in the system.

Project development will involve the following phases and activities.

Phase A. Preparing introductory actions

Phase B. Studying the applications which can be used to analyze purchases in the supermarket chain. With these applications we aim to acquire a set of data analysis tools which will enable the supermarket to design effective promotion campaigns. Campaign design will include deciding what analysis tools will be used and who the campaign’s target will be. Each of the following applications should be designed and tested on the basis of the characteristics of the supermarket chain’s data. A decision will be made as to which tool is most appropriate for every environment.

- Customer segmentation analysis.
- Searching for purchasing behavior profiles.
- Designing models for purchase forecasting.
- Determining customer’s behavior sequences.

Phase C. Designing the steps in the promotion process.

- Designing different types of campaigns. An objective must be decided upon and the focus of the campaign defined. This will depend on the target public, development over time, the type of offer (product, price, other marketing tools) and the territory affected. We will then construct a model that will enable these objectives to be met. The model will consist of the applications best suited to the campaign’s aims. Here we will design alternate types of campaigns. Each type of campaign will give rise to different alternatives in the remaining steps in the promotion process.

- Designing implementation strategies on the basis of the type of campaign selected. Here we will outline the actions for implementing each of the different types of campaigns designed in the foregoing step. Implementation strategies will decide on the pilot experiences to be carried out and the schedule for implementing the campaign.

- Designing ways to monitor each type of campaign. Each type of campaign will need to be separately supervised and specific data collected in order to be able to evaluate the evolution of the campaign and collect data which can be used as feedback for the system. This should include instruments that can be used to monitor individual behavior as well as the promotion as a whole.

Phase D. Estimating returns on promotion campaigns
• We will modelize a way to estimate returns on, or the strategic effects of a promotion campaigns. We will decide which models will enable us to predict the behavior of a campaign. Before creating these models, we must decide which variables will permit forecasting, the relevant indicators for verifying their behavior, and the models which will enable us to shift from variables to indicators.

• Creating tools for evaluating the effects of campaigns. This will involve constructing the models designed in the preceding step and testing them with an eye to introducing them in the promotion process.

Phase E. Redesigning the promotion process. The new promotion process will be described on a step-by-step basis. The relevant variables, problem-solving models, results sought and tools for control and improvement will be specified for each step.

Benefits of the Project

The main benefit of this project is that companies applying it will obtain a competitive advantage over other companies in their industry. An improved promotion process should enable them to reduce the costs and increase the effectiveness of promotions. This increased effectiveness should translate to more loyal customers

To sum up, this project aims to achieve the following:

• Develop Data Mining applications for analyzing useful data for the promotion process.

• Design various types of promotion campaigns. Each type of campaign will be described using the following information:

• Design monitoring processes. We will specify what information should be collected in order to evaluate campaigns.

• Design models for estimating returns on campaigns.

Bibliography


