The Risk of Optimization in Marketing Campaigns

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ABSTRACT

In marketing one of the most common important tasks is to assign campaigns to sets of customers. These sets of customers, the target groups, consist of persons with similar properties, for example a high buying affinity for a certain product. Database marketers would not only assign a campaign by general economic or promotional consideration, but they take into account learning from databases by algorithms. The basic assumptions are already determined clusters to which campaigns, representing the products, should be assigned. The assignment can be done in the most optimal way by formal optimization, which is usually stochastic due to unknown campaign success in the future. The authors model the financial risk of the campaign success for enterprise practice. Their proposal is to use triangular distributions, known from financial and supply chain management applications. In an example, they demonstrate the benefits of the proposed procedure for the marketing task.

KEYWORDS

Analytics, Data, Value at Risk, Triangular Distribution, Hurwicz Criterion, Financial Marketing, Conversion Rate, Cluster Assignment

INTRODUCTION

Marketing is the discipline that deals with the marketing mix, which is classically the combination of (1) product, (2) place, (3) promotion, and (4) price, according to the original definition of the “four P’s” (McCarthy, 1960, p. 45). The discipline has developed since 1917, the year in which the first book about marketing was published (Butler, 1917). He already considers the costs of marketing and states “Ineffective retail advertising is of value to no one. The store that gets no satisfactory returns from its advertising expenditure soon ceases to advertise or ceases to exist (p. 325).” In other words, advertising is a financial risk with respect to all four P’s. Responsible marketers in shops – today it might be also Internet shops – have to spend money in advance for a campaign without knowing the returns, only having an uncertain expectation about them in mind. Usually, they make estimations about the expected success, if possible considering experience. Thus, marketing was early seen as a management task (Mauser, 1961).

Without giving a complete historical overview of classical work, the authors want to mention the early work about optimization and risk in marketing (Little, 1966) “In risk analysis a set of alternative plans are laid out, the problem being to choose the best. Cost and revenue forecasts are made, with uncertain elements being described by probability distributions (p. 17).” In this work, the authors will start just by taking this thought into account and model the risk by distributions, involving optimization. Little (1966) concludes: “We have reviewed a number of developments in operations research in marketing. Some of them have a brave new world aura (p. 25).” Fortunately,
today an optimal cost modeling can be handled convenient for the marketers without any soupcon of science fiction, as the authors will demonstrate.

From those earlier days on, many statistical techniques were used in the 1970s or 1980s, often named as marketing or market research (Lehmann, 1979), leading to database marketing (Shaw & Stone, 1989; McCorkell, 1997) due to ever increasing amounts of stored customer data. Data mining and machine learning from data warehouses become popular in the following years (Linoff, 2011), including marketing applications of decision trees (Kim, Jung, Suh, & Hwang, 2006), neural networks (Yao, Teng, Poh, & Tan, 1998), genetic optimization (Bhattacharyya, 2003), fuzzy logic (Kaufmann & Meier, 2009), association rules (Wang, Zhou, Yang, & Yeung, 2005), and support vector machines (Shin & Cho, 2006) for example. Two kinds of IT systems can be build around the learning algorithms: (1) recommender systems (Adomavicius & Tuzhilin, 2005) and (2) customer relationship management (CRM) systems (Ngai, Xiu, & Chau, 2009). Recommender systems learn from data specific offers for customers, for example a recommendation for lending the next movie based on previous purchases. CRM systems are a kind of framework for handling all the customer, marketing, and sales data in the sense of a customer life cycle. Even larger amounts of data are stored in file systems with efficient techniques for saving and accessing the data. A popular name for this field of activity is “big data” (Arthur, 2013; Hu, Wen, Chua, & Li, 2014).

Despite larger amounts of data from an increasing (global) number of customers and the availability of more sophisticated algorithms for handling the data, the problem of financial risk does not simply remain, but it gets even a more important topic, because the involved cash flows have increased with more customers, and the real-time automation makes it harder to intervene manually in case of wrong marketing decisions. You could have simply removed a disadvantageous poster from a shop or excused personally to a customer in 1917, but you could not simply undo an Internet campaign with e-mailing to millions of customers. Minelli, Chambers, & Dhiraj (2013) state “While risk analytics is used for risk management, banks are using risk predictive analytics for marketing as well. […] Given people’s exact situation, you have to determine what are the right products to promote (p. 43).” In the next sections, the authors do not want to address specific problems in banks such as fraud protection or credit scoring, but they want to model the financial risk for typical marketing situations in general.

The paper is organized as follows. In the section Methods, the authors explain and formalize the initial marketing situation, show how clustering and optimization is involved in the campaign/product assignment to customers (Campaign and product assignment to customers), formalize the risk measure “value at risk” for their purposes, based on triangular distributions (Value at risk), and derive a heuristic campaign risk measure together with easily understandable visualization (Campaign risk). Additionally, they apply the Hurwicz criterion for risk (Hurwicz criterion). The authors give a complete corresponding example in the section Example and Results (starting with Problem and pregiven parameters, and ending with Campaign risk results). Additionally, in the section Comparison to random results, the authors compare the optimized results with random results. In the last section, Conclusion, the authors summarize the findings.

METHODS

When considering risk, a basic requirement is to identify the potential risk causes and subsequently determine the corresponding risk factors. The complete process of handling risk, beginning with the identification of risk exposures and leading to the implemented risk strategy, is usually called “risk management” (Crouhy, Galai, & Mark, 2014). Marketers could consider many risk factors which the authors divide into the (direct) financial ones and the ones which have more general causes. However, the general risk leads (indirectly) as well to financial loss. In the following, the authors will not consider the general risk which can be for example: IT/CRM system failure, breakdown of media channels such as the Internet or telephone lines, illness of employees, or manufacturing faults. Such risks are often related to the supply chain (Kozlenkova, 2015). One example for severe
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