## **Survival Analysis for Marketing**

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This presentation overviews the applications of survival analysis techniques for marketing. It covers three major areas of applications: customer relationship management (attrition modeling, customer base analytics, customer lifelong value modeling), marketing campaign management (customer selection, marketing campaign evaluation) and trigger event management (evaluation of importance of trigger events and generation of reactive responses).

The customer relationship management (CRM) is the most established area of application of survival analysis techniques. Different techniques are used depending on the type of business settings: contractual settings vs. non-contractual [1]. For contractual businesses, such as telecommunication or cable TV services, the traditional approaches (proportional hazard Cox model or frailty model) are used for attrition modeling. However, so far, most of current survival analysis models used only static variables such as demographics with static or dynamic coefficients for the variables. To provide accurate analysis of customer behaviors, it is necessary to incorporate dynamic variables that specify changes of customer activities. In the presentation we show how to add dynamic variables into the traditional Cox proportional hazard model framework, and compare results with a survival analysis model without dynamic variables. For non-contractual business, such as a Web-based store or a charity organization, the generative parametric survival models are used, which combined with repeat-buying models provide vital solutions for estimating customer base, predicting number of future purchases and evaluating customer lifelong value. We overview the following models: Pareto/NBD [2], BG/NBD [3] and CBG/NBD, and compare their performance on a real dataset that present purchase data from a Web-based store.

Another area of application is the marketing campaign management. The goal is to estimate the performance of a marketing campaign when it it still in progress and find how different customers' features influence it. In this case the recurrent survival analysis techniques are used and the hazard function models the propensity of customers to buy a product. We overviewed the relevant techniques and applied them to estimate the successfulness of a marketing campaign that was conducted by an online store, which is selling holiday-related merchandizes. This campaign used direct mail of discount coupons that were valid for two months. Using survival analysis allowed getting valuable insights about the marketing campaign and customers' purchasing intension, female customers were more willing to purchase, and the discount and gift certificate amounts positively influence the purchases. On the other hand, the amount of refund negatively impacts the customers' purchasing intension since refund is resulted from returned product and indicates the lower customer satisfaction.

We also provide examples of application survival analysis techniques to evaluation of importance of trigger events.

## **References:**

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Topic: Data Mining, Survival Analysis, Customer Relationship Management, Marketing Campaign Management

## Preference: oral/poster