Cosibon: An e-Commerce like platform enabling bricks-and-mortar stores to use sophisticated product recommender systems

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ABSTRACT

Compared to online-retailers, bricks-and-mortar stores have only limited possibilities to understand consumer preferences, their intentions, and their feedback. The first are able to evaluate clickstream data collected on their webpages alongside the actual purchase data to put together a comprehensive view on individual customers. Bricks-and-mortar stores on the other hand have to rely solely on the evaluation of scanner data collected at the point of sale (POS). Thus, akin to the *Event Horizon* in physics, describing the boundary beyond which events are unobservable, we introduce the term *Receipt Horizon* to describe the natural boundary beyond which a retailing company is unable to observe the behavior of individual customers. In this demo paper we present our comprehensive approach on how bricks-and-mortar stores can go beyond the Receipt Horizon. We demonstrate how existing customer loyalty programs can be leveraged by an extensive mobile app, transferring proven e-commerce concepts to physical retailers and collecting numerous novel information about consumers.

Categories and Subject Descriptors

H.2.8 [**Database Management**]: Database Applications—*Data Mining*

Keywords

Recommender system; Bricks-and-Mortar Stores; e-Commerce

1. INTRODUCTION

Several information sources influence a consumer's purchase decision including personal information from family,

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friends, other customers, or renowned experts, and impersonal information from automatic recommender systems or independent research institutes. All of these have an impact on the consumers preferences. However, as stated in [1], "person-to-person communication is more effective than impersonal media sources in changing opinions and transmitting information". Furthermore, customer reviews and word-of-mouth play an important role in shaping consumer attitudes. It is well known that word-of-mouth has a significant impact on customers decision's about purchases. Hence, it follows that the more information sources are available to a recommender system, the better the recommendations will be and improvement leads to greater value for consumers in terms of higher decision making quality. Therefore, online retailers like Amazon.com provide their customers with an extensive platform which serves not only as a POS but also as a comprehensive source of information for both consumers and the retailer. While the consumer uses the information and browses the website to find the most suitable products for her individual needs the retailer is able to keep track of the clickstream data which represents the path a consumer took through the site. Even if the shop visits did not lead to an actual purchase the customer still left some foot prints. The additional knowledge about the product pages visited, the recommendations considered, and the time spent on the website serve as valuable input to improved recommender systems. By nature, bricks-and-mortar stores do not have access to such information as they are missing (1) a comparable data collection platform and (2) a comparable customer interaction platform.

They are thus bound to the analysis of pure purchase data and struggle to keep up with online retailers to provide customers with a comparably exciting shopping experience.

2. THE RECEIPT HORIZON

Following the definition of the Event Horizon in physics, describing the boundary beyond which occurrence and form of events are not observable by an individual in the current space-time continuum, we introduce the term *Receipt Horizon* to describe the natural boundary beyond which a retailing company is unable to observe the behavior of individuals within its customer base. The Receipt Horizon can be interpreted as the border between in-store and outside-store. Everything that happens outside of the store is hidden from the retailer's perception and thus cannot be used for anything.

2.1 Going beyond the Receipt Horizon

In this section we demonstrate how we are able to go beyond the Receipt Horizon by transferring proven e-commerce concepts to bricks-and-mortar stores. The traditional process at the POS is as follows: As soon as a customer has collected all goods she approaches the POS and identifies herself using her personal loyalty card. Subsequently, after all products have been scanned, she receives her paper-based purchase receipt. We believe that the value of receipts is highly underestimated and can be remodeled as an interactive link between consumers and retailers. Accordingly, we put the receipt to the center of our considerations and move the entire process at the POS to a smartphone app. First, we replace the physical, plastic made loyalty card by a screen in the app showing the same barcode. Second, instead of, or in addition to, the paper receipt we send a digital version to the customer's smartphone. The process is implemented in real time, transferring the receipt to the smartphone within a few seconds. Finally, the smartphone app stores the personal receipts and offers a number of customer relevant information about the purchases. The mobile app eventually serves as a comprehensive platform that allows us to collect the same valuable information about consumers' intentions, preferences, and feedback. Using the same clickstream analysis techniques as that of successful online retailers we track every movement within the app.

2.2 Current state of the system

We have already managed to implement an extensive smartphone app that allows us to perform various experiments in the field of product recommendations. The main features include the mobile loyalty card, interactive digital receipts and product pages, as well as a complete social network where customers can connect to friends, share product recommendations, or upload purchase pictures and comment via Facebook and Twitter. The individual items on the digital receipt are linked to individual product pages, where the consumer has access to a lot of additional information. Those include basic information like a description and, if applicable, ingredients but also information that the customer in bricks-and-mortar stores currently has no access to, like popularity information, insights about which friends buy or recommend the product, and average user ratings and customer comments. This product information is also available outside the store: By scanning a product's barcode all of this information can be accessed, too. So not only the products finally bought by the customer are available for analysis, but also those that were only investigated. At various places within the app users have access to personal recommendations, which themselves are of high interest as we can easily measure the success of arbitrary recommendation algorithms. We furthermore added some more features like shopping lists, information about current promotions, and several cross and upselling techniques modeled on successful online retailers. Of particular interest is the tracking of interaction among customers and retailers. App users can send each other messages, recommend products to their friends, share their own purchases, or comment on other people's purchases using a FourSquare like stream. They can also interact with the retailing company by rating the shopping experience and give qualified feedback about the shopping experience right after receiving the receipt. On the product level they can rate and comment on every single

product. Over the past few months of our pilot project together with a European Retailer it was shown that we track about 100-200 user interactions between every two shop visits. It should be highlighted that all person-to-person recommendations, comments, ratings, feedback etc. are directly liked to actual purchases and thus result in data of highest quality.

3. RESEARCHING ADVANCED PRODUCT RECOMMENDATION AND BEHAVIOR PREDICTION ALGORITHMS

Due to space limitations we are not able to give detailed insights into all of our current research projects. Thus, we briefly describe only our major research topic, the improvement of our product recommendation algorithms, some of which have never been deployed in bricks-and-mortar stores before. Currently there are different recommender systems implemented. The first one, is similar to Amazon's Movers & Shakers algorithm. Customers get recommendations based on the changes in popularity of products. The second one suggests products based on the customer's personal purchase history and some other factors. The third feature is not an actual algorithm but more a feature, allowing customers to send personal products recommendations to their friends right over the app. Regarding the first two algorithms we are researching different techniques of how to improve those algorithms even further by integrating additional knowledge about individual customers that is currently unavailable to physical retailers. The third type of recommendations will be used to construct a unique ground-truth for future recommendation algorithms, since we claim that people bother their friends mainly with product recommendations which they know is of high interest for their addressee. We will thus be investigating several machine learning algorithms to understand inter-personal recommendations and to build truly next generation algorithms aside of purchase histories and pure product features. The success of our experiments is immediately observable as we have direct access to the purchase data as well and thus can evaluate which products were actually recommended to which customer using which algorithm and were eventually purchased. We are also able to measure the time-to-conversion and contact-to-conversion. Consequently we are also able to use all the data collected to implement an extensive customer behavior prediction system. To our knowledge, the amount of collectable data and the quality of the data outperforms any other research in the field of product recommendations for bricks-and-mortar stores.

As stated in the beginning, traditional retailing companies have absolutely no insights into the inter-person communication between their customers and are lacking a useful data collection and customer interaction platform. We have given consumers a tool in hand where they can interact with each other and retailers are given a tool where they can, for the first time, observe and evaluate customer behavior beyond the Receipt Horizon.

4. REFERENCES

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