Predictive Analytics in Retail

Quickborn Consulting LLC. Whitepaper

Preface

This whitepaper entails the advanced use of retail data to ensure merchandising success using predictive analytics. Predictive solutions could be used as tools to learn and exploit patterns found in historical and transactional data and identify risks and opportunities that exist in retail business.

What is Predictive Analytics?

To attempt understanding what predictive analytics could do to the retail industry – it is vital for us to understand what predictive analytics is and the delta that it offers when compared to traditional Business Intelligence solutions that the whole retail industry was obsessed about when it came into the scene.

Predictive analytics, in essence, is a process of developing data mining techniques that use analytical models to discover hidden patterns and apply them to predict future trends and behaviors. Predictive Analytics takes history into account to forecast and learn to foresee emerging patterns that can be used as a basis to take decisions for the future.

The process of prediction involves the following steps:

1.   Problem Identification

2.   Determining the Outcome and Predictors

3.   Explore data and segregate data

4.   Test the models

5.   Apply models to an identified population to predict behavior and evaluate.

In most situations, analysts face the challenge of defining the business problem. Successful predictive business problems have quantitative goals. For example:

•   Which of the top 30% of the members are likely to renew the loyalty card, priced at $4 per month?

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- What will the contribution of my high margin customers to overall sales if prices were reduced by 13%?

Without an objective business problem, a predictive project will not deliver useful results because of the lack of a metric to measure success.

An analytics project entails information about the data that will be used. The problem definition could include additional specifications such as one or more of the following:

- Where do I get the data? (Example: POS)

- Who owns the data?

- How do I get access to the data?

- How much data is available and how much data is required?

- Does the data pertain to my business problem?

- Do I have enough data?

- Is the data clean, can it be cleansed?

- Where can I process this data?

Using Predictive Analytics in Retail

Retailers are leading the pack in data collection – from point-of-sale and customer loyalty data to demographics – and are amassing huge data stores. Wal-Mart handles close to 1 million customer transactions per hour, which is imported into databases estimated to contain more than 2.5 PetaBytes of data - the equivalent of 167 times the information contained in all the books in the US Library of Congress. Unfortunately, collecting data is not enough. Tech savvy retailers are looking towards predictive analytics to unleash the power data. Access to the right data mining and predictive analytics solutions can help a retailer take insightful decisions in today's volatile economic climate. Retailers use predictive analytics to set the bar in customer retention, inventory optimization and low-cost promotions which drive increases in profitability and market share.

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Applications of Predictive Analytics in Retail

• Market Basket Analysis

• Customer Segmentation

• Stock-Outs Elimination

• Customer Profitability

• Response Modeling

• Loyalty Program / Churn Analysis

• Pricing / Promotion Planning

• Inventory Optimization

Case Example of Predictive Analytics

Both online and brick and mortar retailers are frenzy about delivering personalized promotional offers to customers based on their purchase patterns. Even retailers like ShopperStop in Emerging Markets like India, where organized retail is at 2%, have more than 50% revenue contributions from their loyalty programs. And hence modern customers tend to appreciate personalization – which gives them an identity of their own – leading to more loyalty and greater basket size.

In this example, let's say a retailer called Shopiz wants to launch a personalized campaign for its loyal customers. But the business head wants to know the cost of running the campaign which includes sending emails, text messages etc... vs the gain that they would get from the campaign that is being launched – to determine the marketing ROI.
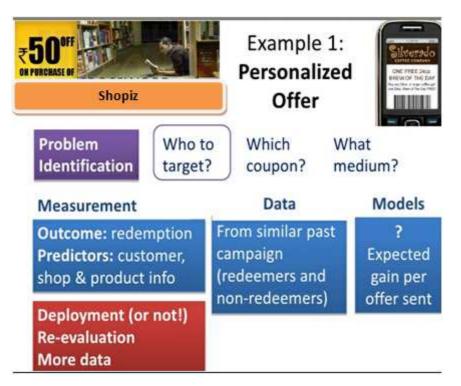
1.   Problem Identification

The total gain would be a factor of the gain per offer and the number of redemptions.

Mathematically,

$$F(Total\_Gain) = Gain\_Per\_Offer * Number\_of\_Redemptions$$

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While the gain per offer can be determined by taking the gross margin of the promoted products into consideration, the number of redemptions remains an enigma for the retailer. And here Shopiz's business turns towards deploying predictive analytics.

2. Determining the Outcome and Predictors

With the background above the outcome of the activity can be understood to find out the redemption patterns using customer data, store attributes and product information like price elasticity.

3. Explore data and segregate data

Exploring the data would involve not just identifying the areas where the data would be available but also in analyzing and correcting the data to determine the necessary outcomes. For example in Shopiz's case the customer data can be found by looking at the loyalty data from the CRM system. To build the model, outliers like customers with exceptional income should be removed to get a more accurate result.

4. Test the models

Let us assume that the best model to identify a redemption conversion is kNN – which is 'k' nearest neighbors. Assuming that we found a high co-relation between customer's

age and income levels influencing redemptions – we plot a scatter plot with respect to those parameters and then identify 5 nearest neighbors from the historical data and then based on a majority vote decide the likelihood of the redemption. In most cases the likelihood of redemption justifies the spend incurred in educating the customer about the promotion being run.

5.   Apply models to an identified population to predict behavior and evaluate.

In an attempt to improve the accuracy of the identified model, analysts some time deploy the hidden draw model – where 80% of historical data is taken to determine the best model and then the 20% of the rest of the historical data is used as a test bed to predict. The difference between the accuracy of the prediction and the actual is very indicative of the MAPE (Mean Absolute Percentage Error) and WAPE (Weighted Absolute Percentage Error). The models are then corrected and deployed in live and the cycle of feedback continues. In any predictive modeling, the accuracy improves to a point of data or model incompetence.

<u>**Summary**</u>

With growing demands of an ever progressive customer, retail needs to keep pace with evolving trends. With the global localization, new strategies need to be adopted by retailers in all economies to remain relevant in the customers mind. Predictive Analytics can provide the framework within which intelligent decision making could be made possible with higher business efficiencies.

About Quickborn Consulting:

Quickborn Consulting is a provider of business consulting, IT systems integration, solutions development and support services for the global retail industry. The company supports retailers on their business and IT transformation programs to improve their performance and increase their competitiveness. Quickborn Consulting has local presence in USA, France, Germany, Hungary, India and Ireland, and is present globally through its international network. Read more about Quickborn Consulting at: www.quickbornconsulting.com

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