Know Your Buyer:
A predictive approach to understand online buyers' behavior

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Introduction

Retail and E-commerce are one of the first industries that recognized the benefits of using predictive analytics and started to employ it. In fact understanding of the customer is a first-priority goal for any retailer. In today's competitive business environment understanding of your customer requirement and offering the right products at right time is the key of any successful business. Due to high growth of internet, online shopping is becoming most interesting and popular activities for the consumers. Online shopping is providing a variety of products for consumers and is increasing the sales challenges for e-commerce players. Research suggests that online sales have grown 16.1% year-over-year from March 2010 through March 2011[1].

Both brick and mortar and pure play online retailers are evaluating its performance in terms of transactions – how much the customer bought, the size of the purchase, leaving the site before buying, but failed to take the pulse of the customer experience and the role the e-commerce site played in the shoppers' purchasing decisions. One example from retail is how Hickory Farms is leveraging their online visitors' data to improve the customer experience and the driving factors of online shoppers' behaviors. Using predictive analytics, the company identified an untapped sales opportunity for new items based on Hickory Farm shoppers' online behavior[2].

Different analytical techniques like A/B/multivariate testing, visitor engagement, behavioral targeting can lead toward high propensity of a prospect's willingness to buy. This paper provides insights on how the online data can support customized targeting, resulting in incremental increases in e-commerce revenues by advanced predictive modeling on visitors' behavior.

The Opportunities & Challenges

Most of the online retailers want to understand their customer behavior and need to maximize customer satisfaction. Retailers would like to build an optimum marketing strategy to deliver the targeted advertising, promotions and product offers to customers which will motivate them to buy. Most of the retailers find the difficulties to digest all of the data, technology, and analytics that are available to them.

Table 1: Apply Advanced Analytics in E-commerce

Example	Description	Business Value
Customer Segmentation	Groups customers together statistically based on similar characteristics, helping to identify smaller, yet similar, groups perfect for targeted marketing opportunities.	✓ Use segment profile information to drive offers, advertising, and direct marketing ✓ Track continually changing customer preferences and expectations ✓ Link segments to CRM and business intelligence environments
Basket Segmentation	Provides information about customers through the contents of each transaction, even when it can't be identify.	✓ Classify each basket into segments based on apparent mission of the customer while coming to store ✓ Behavioral segmentation is "the voice of the consumer" in that it utilizes variables that the customer directly controls ✓ Identify key customer behaviors and adjust marketing merchandising and operations plans to address specific, desirable behaviors
Affinity and Purchase Path Analysis	Identifies those products that sell in conjunction with each other on an everyday, promotional, and seasonal basis, as well as the links between purchases over time.	✓ Use results for cross-product promotions, selling strategies, and overall product merchandising. ✓ Identify which products are purchased in addition to promoted products. ✓ Identify products that drive the purchase of primary items
Marketing Mix Modeling	Provides customer promotion campaign response models, product propensity models, and attrition models that predict customer behavior.	✓ Devise communication strategies that match appropriate and relevant marketing messages to the right targeted customers ✓ Predict the likelihood of a customer's response to an offer based on product appeal, offer receptivity, and frequency of use ✓ Predict ROI on each marketing campaign by media type and expenditures –category, region, and time

The ability to identify the rich customers in their buying decision making process is heavily influenced by the insights gained in the moment before the buying decision is made. Thus to build a predictive decision making solution towards a particular product or services would be very effective to increase ROI, conversion and customer satisfaction.

Predictive Analytics Solution Frameworks:

The process of click stream data is different than normal CRM data processing to build the predictive model. The data is usually semi-structured and collected from respective web server. Figure 1 depicts the detailed step by step process to perform the online buyers' behavior analysis.

Figure 1:
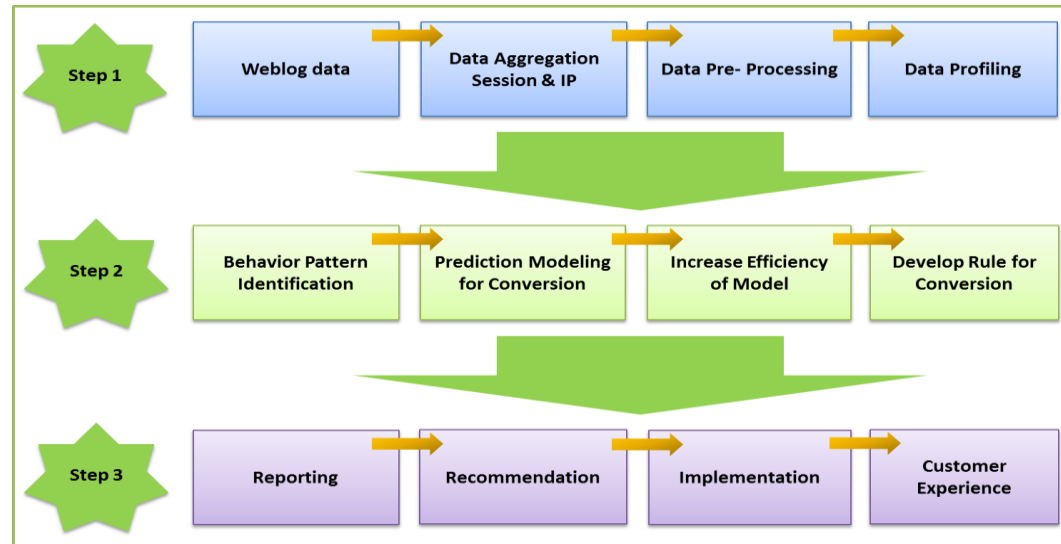
Case Study

Executive Summary

Millions of consumers visit e-commerce sites, but only few thousands visitors may buy the products. The E-retailer wants to improve the customer experience and would like to improve the conversion rate. The objective of the study is to identify the potential buyers based on their demographics, historical transaction pattern, clicks pattern, browsing pattern in different pages etc. Data analysis revealed the buyers' buying behaviors which are highly dependent on their activities like number of clicks, session duration, previous session, purchase session, clicks rate per session etc. Using the solution framework (Figure 1) and applying data mining and predictive analytics methods, the propensity to conversion scores of each visitor has been derived. This leads to multiple benefits of the e-retailer to offer right & targeted product for the customers at right time, increase conversion rate and improve customer satisfaction. Based on

this analysis retailer can optimize the marketing strategy based on identified hidden factors of conversion and understand the purchase funnel of customers.

Results:

Figure 2:

Graph 1: # visitor & buyer per shops

Graph 2:

SHOP_ID	# Visitor	# Visitor (Click >1)	# Visitor (Click =1)	# Buyer	Avg Click	Median	% Click*
Shop1	61,391	25,815	35,576	1,531	6.0	1	14%
Shop2	41,740	14,722	27,018	323	6.6	1	11%
Shop3	58,018	27,091	30,927	468	7.8	1	18%
Shop4	123,892	34,778	89,114	3,793	7.3	1	35%
Shop5	36,191	14,234	21,957	1,016	5.6	1	8%
Shop6	38,527	19,773	18,754	222	5.6	2	8%
Shop7	20,716	9,105	11,611	186	5.7	1	5%

Graph 3: # Visitor per shops per days*

Graph 4: # Visitor per shops per hours*

Insights

✓ Visitor who visit shop 4 has high chance to buy an item ~ *Graph 1*
✓ Shop 5 visitors already decided about product ~ *Graph 1*
✓ Shop 4 has very high single click visitor ~ *Graph 2*
✓ Low number of visitors on weekend and during 10PM -6AM ~ *Graph 3&4*
✓ High number of visitors on Tuesday and Wednesday ~ *Graph 3*
✓ People prefer lunch time to visit the site ~ *Graph 4*

Figure 3:

Graph 1: # Visitor across click group*

Graph 2: # Visitors across duration of visit**

Graph 3: Avg. Click & purchase probability across days*

Graph 4: Duration of visit across shops

Insights

✓ Very high conversion with visitors with 10 – 20 clicks ~ Graph 1
✓ High conversion during 5 -30 min of visit ~ Graph 2
✓ Visitors click more on weekend but conversion is less ~ Graph 3
✓ Customers visited Shop 4&5 already decided to buy~ Graph 4

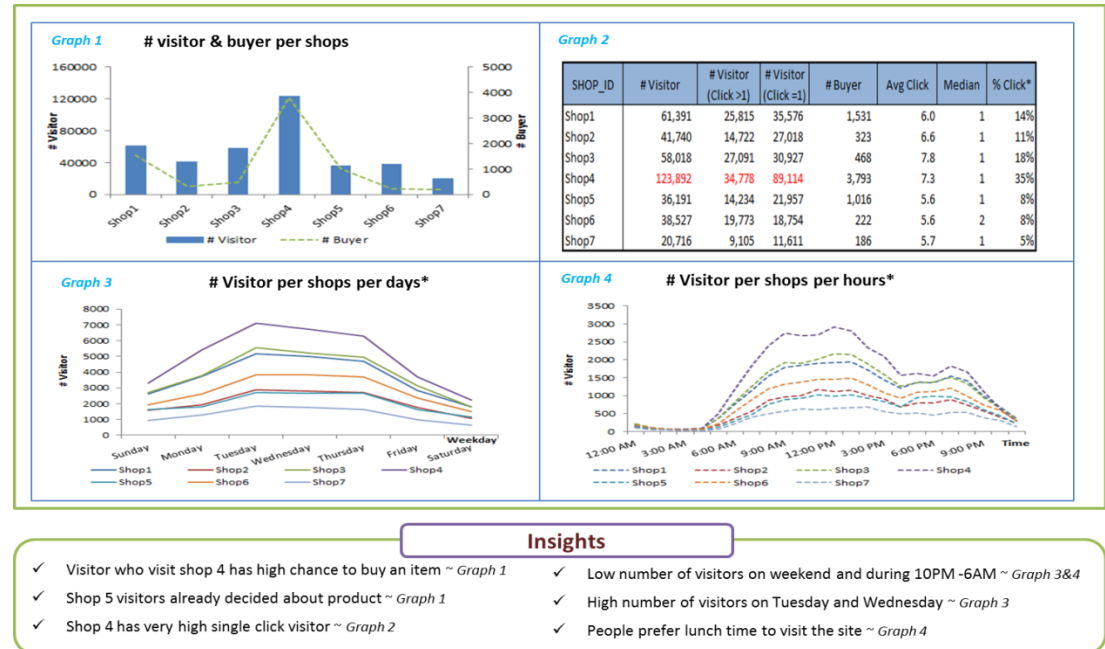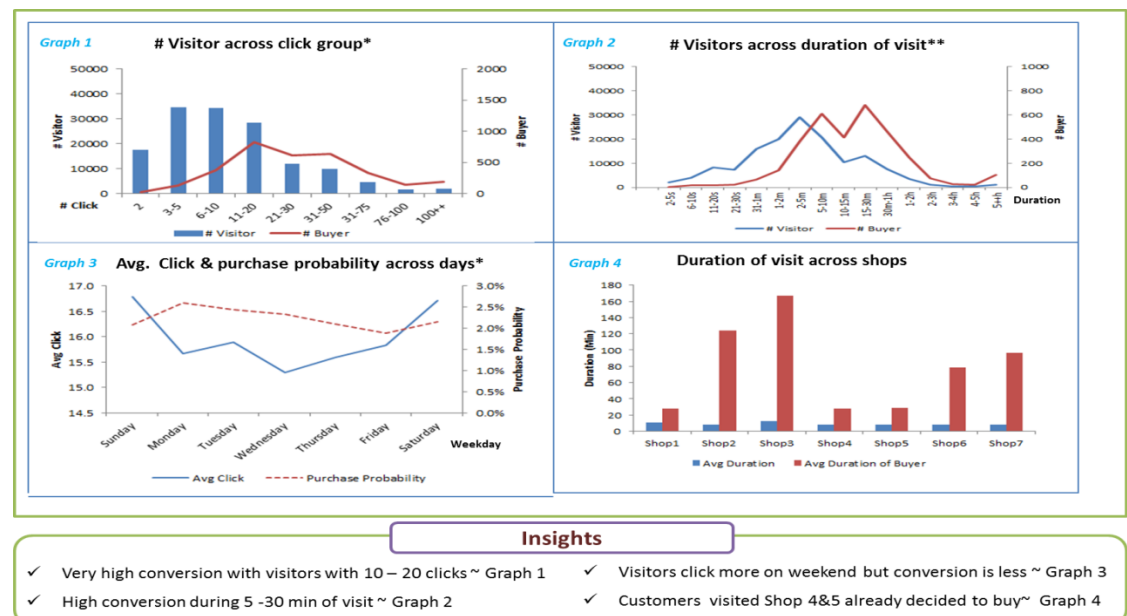## Conclusion

The above solution framework shown in the Figure 1 can be customized with the specific requirement with each client. Due to technology agnostic nature of this it can be integrated with any existing database platform without modifying the present process and infrastructure significantly. The data can further be sliced and diced using our proprietary data mining algorithms and methods which will lead to the customers towards optimizing their strategy, improve significantly on the ROI and increase consumer satisfaction.

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