Actionable Web Analytics: Customer Segmentation Approach Based on Behavioral Patterns in E-Commerce Industry

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Abstract: Customer Segmentation is grouping together of customers based on the similarities shared by them in different marketing ways such as demographics, purchase intents, interests, price sensitivity, discount sensitivity, category preferences etc. Current Web Analytics software provides information based on metrics such as page views, subscriptions etc. However the information provided by such metrics doesn’t provide the necessary key insights. The proposed segmentation approach is based on behavior segmentation and provides segmentation of users based on behavioral patterns: Category Preferences, Price Sensitivity.

Keywords: Web Analytics, Behavior Segmentation, Category Preferences, Price Sensitivity

1. INTRODUCTION

With the advent of Internet, the opportunities for online business opened up. Advancements in technology paved the way for new innovations and there arrived a need to keep up with innovation and new technology in order to serve customers better. Organizations across the globe started capitalizing on the powers of web by means of web based initiatives such as E-Shopping, Advertising etc. With the advent of the said web based initiatives, a need to have an analytical framework arose that would cater in identifying user needs, understanding their behavior and act accordingly. Such analytical framework in literature is termed as Web Analytics. Indeed it is a tool that provides objective tracking, collection, measurement, reporting, and analysis of quantitative Internet data to optimize websites and web marketing initiatives [1]. Segmentation is the heart of Web Analytics. The purpose of Segmentation is to define focus on specific “slice” of site visitors. Segmentation is usually classified into four types [2] Geographic segmentation, Demographic segmentation, Psychographic segmentation, Behavioral segmentation. Geographic segmentation is based on factors such as the region of the country, market size, climate etc. Demographic segmentation takes into account information such as age, gender, income etc. On the other hand Psychographic segmentation has more detailed information than demographic segmentation involving factors such as motives, lifestyles and experiences. Behavioral segmentation is considered the most actionable segmentation approach. In this approach the customers are divided into clusters based on different signals like customers shopping interests, category preferences, price sensitivity etc.

Apparent in current Web Analytics software’s much focus is laid on demographic and geographic segmentation of users in order to find meaningful insights. However one of the main limitations of such segmentation is its one-dimensional approach, with the belief that all individuals who belong to a particular “group” have the same needs, which is not necessarily the case. It is therefore necessary to develop analytical systems based on segmentation methods that take into consideration the user behavior, shopping interests, shopping habits, preferences and responses towards a product.

The Proposed segmentation approach will provide segmentation of users based on user behavior which include category preferences and price sensitivity. The segmentation approach also takes into consideration the data that is user independent and is termed as Site Level segmentation which includes segments like product categories and attributes.

2. RELATED WORK

Since the advent of Web Analytics, Researchers consider Segmentation as the primary (the only practical way) way of identifying actionable insights which in turn leads to higher usage and increased revenue for e-retailers. However most of the Web Analytics tools focus more on Demographic and Geographic segmentation which do not provide the necessary Key Insight Analysis (KIA). In order to achieve key insights, researchers have proposed many behavior segmentation approaches that facilitate deeper analysis of the available metrics, thereby providing programmable actions using analyzed metrics, which can be used as feedback for customer personalization. Researchers of Google Analytics have introduced 3 behavior segmentation features which are: User Engagement [5], New vs. Returning User [6], Audience Frequency and Recency [7] thereby identifying how much time people spend on the website, the ratio of returning to new users by number of visits and percentage of visits and the level of user interest in a website.

3. THE PROPOSED APPROACH

In order to improvise the actionability of Web Analytics tools we looked on various behavioral signals and found two important signals that generally produce interesting segments. The first type of signal we have found...
interesting is what we term as “category preferences” of customers while the other signal is termed as “Price Sensitivity” of customers.

3.1 Methodology
Using appropriate methodologies is as important as identifying the right segments. Since the category preferences and the price sensitivity of Users are bound to change taking into consideration the various factors such as Occasions, Climatic Conditions, purchase intent etc the process of determining the category preferences and price sensitivity should be based on data captured on-line (Real Time Data) as well as off-line (Stored Data).

3.2 Algorithm for Category Preferences
Stage 1: Identify unique users
Stage 2: Calculate the number of hits (Re-Access Value) made by each user for each category
Stage 3: Calculate the total number of hits made by a user pertaining to present session
Stage 4: Calculate the category preference score (CP) for each category (c) for each user as

\[ CP_c = \frac{RA_c}{N} \]

Where RA is the Re-Access value for a category (c) and N is the total number of hits to all categories made by a user in a session
Stage 5: Normalize the CPc score
If the category is visited for the first time by user

\[ CP_c = \frac{CP_c}{N \times 10} \]

Else

\[ CP_c = \frac{CP_c}{CP_p + CP_c} \]

Where \( CP_p \) is the \( \sum \) of stored category preference scores of category(c) for previous sessions and \( CP_c \) is the category preference score of category(c) for current session.
Stage 6: Store the CPc value for each category for each user session
Stage 7: For each user identify the most preferred categories (based on CPc score)
Stage 8: Segment users according to their preferred categories

3.3 Algorithm for Price Sensitivity
Stage 1: Identify unique users
Stage 2: Store a list L of products displayed to the user
Stage 3: Store the price for each product in list L
Stage 4: Arrange the products in list L according to their categories
Stage 5: Calculate \( P_{min} \) (minimum product price) and \( P_{max} \) (maximum product price) for each category in the list L
Stage 6: For each product clicked by the user calculate the normalized product price as

\[ PP_n = \frac{P_p - P_{min}}{P_{max}} \]

Where \( PP_n \) is the normalized product price, \( P_p \) is the clicked product price, \( P_{min} \) is the minimum product price in the list L and \( P_{max} \) is the maximum product price in the list
Stage 7: Calculate the price sensitivity of each user as

\[ PS_u = \frac{NC_u + PP_n}{NC_u + 1} \]

For a new user
Where \( PS_u \) is the price sensitivity of a user, \( NC_u \) is the total number of products clicked by the user; \( PP_n \) is the normalized product price.

For a returning user,

\[
PS_u = \frac{(PS_p \times NC_u) + PP_n}{NC_u + 1}
\]

Where \( PS_p \) is the previous price sensitivity of a returning user.

Stage 8: Store the Price sensitivity of each user.

Stage 9: Segment users according to their price sensitivity score.

4. CONCLUSION

The research presented, will thus provide segmentation of E-commerce customers based on their behavior and helps in improvising the actionability of Web Analytics tools by providing Key Insights. The proposed work has been successfully tested on a E-commerce site Artsya (www.artsya.com) and it was observed that the system performs better, providing programmable actions by performing deeper analysis of the available metrics that can be used as feedback for personalization.

References

[3] Retail Analytics – Emmit Cox (Book)