Predicting Ecommerce Conversions with Google Analytics KPIs

Amanda Ly, Computer Information Systems
Mentor: Dr. Xuesong (Sonya) Zhang
Kellogg Honors College Capstone Project

ABSTRACT

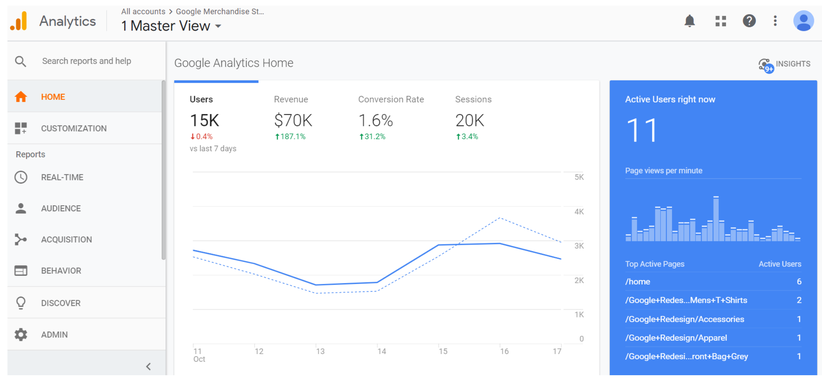
Identifying Key Performance Indicators (KPIs) is a critical success factor to online businesses as it helps businesses to effectively measure performance, optimize, and achieve their objectives. E-commerce sites in particular consist of unique set of KPIs around their audience, acquisition, behavior, and conversions. Using Google Analytics, businesses can analyze factors such as user's device, browser and channels, number of page views per session, time spent on page, and shopping cart abandonment rate. The objective of this study is to identify the most relevant KPIs to revenue, page views, and hits for an e-commerce site like the Google Merchandise Store. We used data analytics tools like Google Analytics, Tableau, and RapidMiner, and applied machine learning algorithms like linear regression, KNN, decision trees, and Naive Bayes to construct predictive models for eCommerce KPIs and predict their impact to revenue, as well as page views and hits.

Excel

tableau SOFTWARE

Google Analytics

rapidminer



DATA FIELDS

- Transaction Revenue
- Page Views
- Hits
- Bounces
- New Visits
- Channel Grouping - Organic, Referral, Paid Search, Affiliates, Direct, Display, Social, Other
- Browser – Chrome, Firefox, Safari, Internet Explorer, Edge
- Operating System – Windows, Macintosh, Linux, Android
- Device – desktop, mobile, tablet
- Medium - affiliate, organic, cpc, cpm
- Source – google, bing, yahoo

GOOGLE ANALYTICS

Audience	Acquisition	Behavior	Conversions
New vs. Returning	Google Ads	Time on Page	Shopping Behavior
Demographics	Referrals	Pageviews	Checkout Behavior
Device & Browser	Search queries	% Page Exits	Promotions

Revenue by City

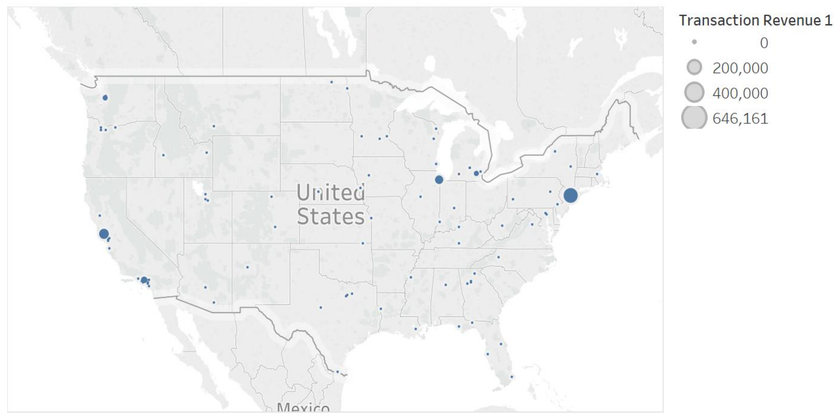


Table 1: Strength of Linear Relationship Between Dependent and Independent Variables

	Revenue	Page Views	Hits
Page Views	-0.000916572	X	0.986306357
Hits	0.003219693	0.986306357	X
Bounces	0.000666489	-0.465346608	-0.440488034

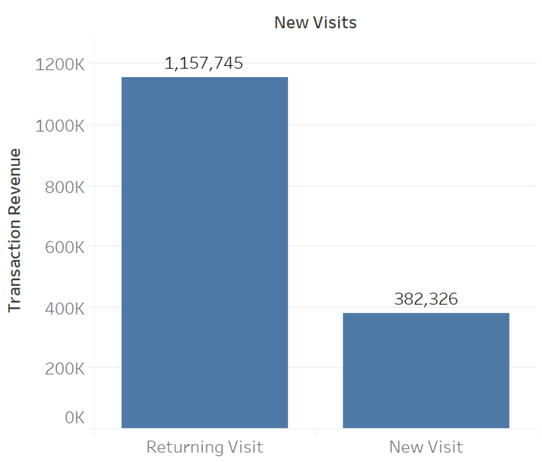
Table 2: Linear Regression Analysis with Significant Correlation Found,
A low p-value (< 0.05) and/or high r-square (> 0.5)

Variables	R-Square	P-Value	Coefficient	Significance F
Page Views (X) Hits (Y)	0.9728	0	1.309133	0
New Visits (X) Transaction Revenue (Y)	0.000323	0.05399	-19.0472	0.05398985
New Visits (X) Page Views (Y)	0.019176	2.27E-50	-2.22953	2.2704E-50
New Visits (X) Hits (Y)	0.018841	1.63E-49	-2.9333622	1.63E-49
Channel: Organic Search (X) Page Views (Y)	0.001925	9E-06	0.606425	2.49E-06
Channel: Organic Search (X) Hits (Y)	0.001778	6.04E-06	0.773574	6.04E-06
Channel: Referral (X) Transaction Revenue (Y)	0.000332	0.050664	58.24765	0.050664
Channel: Referral (X) Page Views (Y)	0.030017	3.11E-78	3.504622	3.11E-78
Channel: Referral (X) Hits (Y)	0.029202	3.94E-76	4.588209	3.94E-76
Channel: Paid Search (X) Page Views (Y)	0.002059	1.12E-06	1.884775	1.12E-06

FINDINGS

1. Page views and hits have a high R-square of 0.9728 and p-value of nearly 0, meaning that there is a strong correlation between the number of pages a visitor views and the number of hits that visits generates.
2. Strong correlation between return visitors with transaction revenue, page views, and hits.

New Visits vs Returning Visits



CONCLUSION

Web Analytics is a powerful tool used to assess and improve the effectiveness of an ecommerce website. Although our model could not accurately predict revenue based on specific KPIs as a result of large variability in the data, we found informative insights within overall conversions. In general, return visitors generate more revenue, page views, and hits than new visitors. Page views and hits also have a very close correlation to one another. Additionally, we found unique trends around users' device, channel, and browser. As expected, the most popular browsers were Chrome, Firefox and Safari. Interestingly enough, the most common device was desktop, however, tablet users contributed more to revenue. Referral and Organic channels was the most impactful towards conversions.