

Projecting Segment Volume to Support Ad Impression Targets

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May 26, 2017

Overview

In 2016 we successfully deployed behavioral targeting for US users after an extensive sequence of testing in

- Motorcycle owner behavior modeling
- “Lookalike” audience segment qualification rules for targeted volume and stability over time
- Segmented users get a cookie in their browser (qualification is re-checked and cookie recreated on every page load)
- Analysis of advertising impression performance on our website against segment volumes
- Lookalike segments are monitored for our confidence levels in identifying them as motorcycle owners

Behavioral targeting consistently outperformed its goals for the first two years of the program. The program was expanded from 5 brands in 2016 to 15 brands in 2017.

Advertisements are served on the website based on a cascade of logic related to whether users are logged-in registrants (known), qualify for a behavioral segment(s), are on certain topic-related pages, and so forth. We use an advertisement serving platform to structure individual campaigns based on this logic. The ad serving platform loads ads on any given page load based on complex algorithms taking these settings into account, but also taking into account all the campaigns in the system and their monthly goals. So we do not have full direct control over ad serving. A buffer needs to be built into segment volume to account for the (currently unknown) leeway taken by the ad serving system. If it's possible to learn more about what that “leeway” looks like, that would be helpful, but that is probably out of scope of this investigation since it would involve analyzing all settings of all campaigns across multiple months, then trying to deduce how they are interacting.

The question to be investigated is:

How greatly could we expand our ad impression targets for 2018?

Two questions address this:

- To what extent could the current behavioral segments support more impressions if we raise the targets in the ad server – without adjusting underlying segment volume
- For segments that would have to be bigger to support the increase, how large would they need to be? That is, for each user in a segment, how many impressions per day can we project will be shown per n segment volume?

Because our program has been overperforming, and there are complex algorithms (or murky data) involved at a couple of levels, we have never developed an exact ratio of “ n users in a segment provide y impressions”. We need to identify this number to project increasing impressions.

Data Sources

- Advertising Impression numbers come directly from the ad server platform. No granular data is available, only:
 - Campaign
 - Date
- Number of impressions
- Segment volume numbers come from our audience segmentation system, which ingests select data from our analytics system. The information is not terribly granular since it's a segmentation system not an analytics or user data system.
 - Segment Name & ID number
 - Segment volume in 1, 7, 14, or 30-day increments, defined in two ways:
 - ++“Real-time” volume which is actually the number of users added to the segment during that time period. ++ “Total” volume which is the number of users altogether in the segment.
 - Segment rules (behavioral logic; this is defined and controlled by me via other analysis focused on volume and level of confidence in the lookalike accuracy)
- As needed I can do additional research in the web analytics tool.
- Business Request. The advertising department has offered hypothetical targets for reality testing.

- Publication Data. Because segment behavior is influenced by topics published on the site in a given day, week, or month, it would be informative to analyze a clearer relationship between segment volume and information published. This information doesn't exist as such and I'll have to manually derive it by looking at the site and/or seeing if I can define a way to derive it out from the website analytics reporting. It would be ideal to automate all inputs like this since a secondary goal of this analysis is to put in place a more automated way of monitoring the ongoing performance of the behavioral targeting program.
- Selected Facts
 - I will bring in a handful known facts from outside sources. For example, each of these universes have a "known universe" cap. There are only so many owners in the US of each type of motorcycle. Projections couldn't land at a segment greater than some percentage of the known universe. For this I'll use best practices researched by our advertisement department.

Confounding Factors

Data Issues

- Not all site pages carry paid advertisement, so it's not possible to directly calculate from typical site metrics such as pageviews or site visits how many ad impressions might be assumed; a user might visit the site and in eight pageviews look at 0 ad-serving pages, or at three ad-serving pages.
 - I do have access to user activity data for the website, so if it becomes useful, some research could be incorporated to develop generalizations about ad-serving page views per visit, or at least per x length of visit, but this type of usage varies between users and between visits. + "Real-time" segment volume is only an indicator; because it takes several steps to qualify, the real-time users on a given day probably do not see a lot of behaviorally targeted advertising because by the time they qualify, they are probably nearly finished with their visit for the day. There is no report of already-qualified users who were active on the site that day, which would be the most useful precise number to get out of the report.
 - "Total" segment volume is not very useful. Users might qualify for the segment on the first day of the month and not return to the site until the first day of the next month. So that count indicates total users who have qualified but not their activity level on the site.

Publication Issues

- Audience segment activity levels are to some extent dependent on publication. Owners (and owner lookalikes) prefer articles about their own brands.
 - If the site doesn't happen to publish anything about their brand in a given week, that segment volume will be lower.
 - Segment volume will peak the day a new post comes out about their brand.
- While we do publish sporadically throughout the week, most articles are published the same weekday of the week. Traffic slumps Friday through Sunday and peaks between Monday and Thursday.
 - So while the target is monthly impressions, it makes sense to run day-of-the-week target calculations making sure the peak day will get the needed volume.

Advertising Campaign Structure

- Ads are sold in packages of various types: as alluded to before, while this project focuses on the behavioral ("lookalike") targeting, we also target known (registered/logged in) users, target contextually by page subject matter and by other context or user-related details.
- Another factor in determining what segment volume is needed to support target impression numbers is: how many targeted campaigns can possibly be running at once. Different owner populations can support 1-5 targeted campaigns.
- Because of our campaign rules (e.g., the same campaign can't be displayed more than once on the same page), segments with two campaigns running at once seem to perform *somewhat* comparably to segments with one campaign, but three to five campaigns running simultaneously for the same segment will require a larger underlying segment volume.
- There is also seasonal variation but since we are in some of the peak months now, current analysis should cover peak months; some simple final checks to account for variation across the year will suffice to address that.

Approach

1. Baselines: I've requested April advertising campaign impression numbers from the advertising division as a baseline investigation
2. "Uncapped" baselines to determine current segment capacity: During May, the advertising team is running the behavioral targeting campaigns at "uncapped" numbers. That is, while usually they enter a target impression number in the ad server, this month they entered an unrealistically high number to see how much volume would be served if limited only by current segment size.
 - Note we don't totally know what the effect is in the algorithm of the "uncapped" setting and need the full month of May data to see what got served; the behavioral targeting (BT) serves will still be constrained by other views, other targeting types, and other campaigns.
 - Two brands didn't sell campaigns this month and therefore have no data; they'll need to be extrapolated from other brands

3. Break down monthly targets

- Taking into account the daily variation, what number of impressions are needed weekly and per-day-of-week? This affects segment definition since the lookalike segment needs to meet peak demands in order to reach monthly goals. (If there are a million users in the segment, but they all visit only on the last day of the month, the advertising campaign will still fail.)

4. Determine:

- What is the current segment volume “performance” – that is, how many impressions can a given segment volume provide
- Are behaviors (therefore volume needs) somewhat consistent across brands, or does each brand have its own ratio of segment volume to possible impressions because of the behavior and publication variations?
- What is the confidence level on that prediction, either generally across all brands, or within each brand?

As part of this investigation, I will also try to define better inputs than those given in the system. For example, given the audience segment data issues discussed above (regarding the “real-time” or “total” segment data), can I get daily numbers out of the analytics system of active users on the site who had the segment cookie for targeting, giving me a better active segment volume indicator than any of the data available in the audience segment tool. I will work with my mentor to identify other opportunities for refining the inputs to the analysis based on available or research-able information.

The first step after this overview and methodology planning will be to tidy the data to be used. The information points right now are coming from disparate systems, in disparate formats, and none of them are structured for analysis. The first step will be to determine the combined dataset format(s) that will best enable exploration.