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Introduction

For this assignment, I was tasked with looking at Firefox data from a week-long test flight with customer surveys and usage analytics and determining whether I recommend the next version of Firefox focus on providing enhanced support for bookmarks or for tabbed browsing. I was given access to three tables calles “users”, “surveys”, and “events.” These three tables contain the following information:

|  |  |
| --- | --- |
| Users | Unique user ids  Firefox version used  OS version  Test Pilot extension version  Number of extensions installed by user |
| Surveys | Unique user ids  Background survey responses |
| Events | Unique user ids  Recorded events in browser  Associated event data  Timestamp |

I chose to focus my analysis on users who answered the survey and said they do not use Firefox as their primary browser. Although it is cheaper to keep existing customers than to acquire new ones, I believe that because of Firefox’s overall customer profile it is worth focusing on winning these new customers through minor changes that will also enhance user experience for existing users. I will return to this below after outlining my preliminary analysis.

To begin with, I looked at survey responses to determine what browsers Firefox users say they consider to be their primary browsers. The results show that the majority of survey respondents already consider Firefox to be their primary browser (“primary users”). While encouraging, this number is likely very skewed in Firefox’s favor – people who already know and like Firefox are more likely to respond to a voluntary survey than those who use other browsers more often (“non-primary users”). This indicates to me that the percentage of users who are actually using Firefox that don’t consider it to be their primary browser is likely *higher* than the 11.6% of survey respondents who answered this way. I believe they simply did not take the time to answer the survey because they did not feel as much of a connection to the browser. This is the first reason I chose to focus on non-primary users – there are likely more users out there who use Firefox but aren’t primary users than we are aware of, which is a potentially large market.

I then considered survey responses concerning the length of time users had been browsing with Firefox to confirm that non-primary users are worth pursuing. This analysis showed that the majority of Firefox users have been using the browser for over 3 years (about 72%). Again, because people who know and love Firefox were probably more likely to answer the survey than those who are brand new users, these results are likely skewed in favor of longer-term users. However, the survey responses still indicate that current Firefox users are very loyal. Since my goal is not to recommend stopping or decreasing support to either bookmarks or tabs but to recommend which one to enhance support for in the next version of Firefox, I am confident that primary users will not flee to a new browser as a result of a browser feature improving.

Because of the apparent large number of Firefox users who do not consider it to be their primary browser (but are still using it) and the loyalty of existing customers, I decided non-primary users would be a good segment of all Firefox users to choose to focus on in further analysis. The recommendations I will make at the end of this memo are intended to turn as many non-primary users into primary users as possible.

Analysis

*Bookmarks*

After determining what users I wanted to focus on, I was able to begin looking at the behavior of non-primary users against primary users to see how their browsing behaviors are different. The first behavior I looked at was bookmark use. There were several different ways bookmark use was recorded in the events table provided.

|  |  |  |
| --- | --- | --- |
| BOOKMARK\_STATUS | Recorded when a user starts Firefox | Total number of bookmarks found on a browser  Total number of bookmarks folders found on a browser  Maximum depth of bookmarks folders |
| BOOKMARK\_CREATE | Recorded when a user creates a bookmark or a bookmark folder | Records either “new bookmark added” or “new bookmark folder” |
| BOOKMARK\_CHOOSE | Recorded when a user chooses a bookmark |  |
| BOOKMARK\_MODIFY | Recorded when a user deletes or moves a bookmark | Records either “bookmark removed” or “bookmark moved” |

First, I looked at the average number of bookmarks a user has and learned that the average Firefox user has 173.3 bookmarks saved. (For this and all subsequent analysis, I removed query results that were more than two standard deviations from the average results to make sure my measures of central tendency were not impacted by outliers not representative of most users). I did not consider bookmark folders because my goal is to determine how widely and frequently used bookmarks are, not to determine how users like to organize them. I then looked at the average number of bookmarks for primary and non-primary Firefox users – I wanted to see if one group used them more heavily than the other. Unsurprisingly, primary users had an average of almost 30 more bookmarks than non-primary users (178.7 vs 151.7). This makes sense because somebody who spends the majority of their browsing time on Firefox is likely to create more bookmarks than someone who tends to use a different browser.

To make sure that there wasn’t a recent tendency for non-primary users to create lots of bookmarks that just wasn’t reflected yet in the average number of bookmarks per user, I then checked to see if primary users or non-primary users were creating more bookmarks during the sample week. I found that almost twice as many primary users as non-primary users created bookmarks (8.1% vs 4.6%). I also wanted to see who was more likely to launch (choose) and existing bookmark – maybe non-primary users don’t have as many, but they use them a lot. However, this also was not the case. Primary users were far more likely than non-primary users to launch bookmarks (29.8% vs 17.5%).

Finally, I wanted to look at all user interactions with bookmarks – creating, choosing, and modifying – to see which group was in the lead. As the chart on the right shows, primary users interacted with bookmarks significantly more often than non-primary users.

From this analysis of bookmark usage by primary and non-primary users, it is clear that primary users had many more interactions of every type with bookmarks than non-primary users did and also have more bookmarks saved in their browsers on average. It seems unlikely that Firefox can turn non-primary users into primary users by focusing on bookmark support for the next version.

*Tabs*

Since bookmarks are not the way to attract more primary users, perhaps tabs are the answer. I began my analysis of user behavior around tabs by checking on events related to tabs that were recorded. The events table documented them as follows:

|  |  |  |
| --- | --- | --- |
| NUM\_TABS | Recorded when memory is recorded (at startup and every 15 minutes) and whenever a window or tab is opened or closed | Number of windows  Number of tabs |

When I looked at these query results, I aggregated them by average number of tabs to get an idea of how many tabs each user was likely to have open at any given time. The average Firefox user during this week had 7 tabs open. When I focused on primary vs non-primary users, I found that primary users actually have *less* tabs open on average than non-primary users (8 vs 9.3). This is a notable difference in user behavior between the two user groups.

With this information in mind, I wanted to find out if computer performance was inversely related to the number of tabs a user has open. A good proxy for this is memory usage. If lots of memory is being used, a computer will run slower. Therefore, if opening a lot of tabs uses a lot of memory, computer performance will be adversely affected.

*Memory Usage*

Fortunately, the events table recorded memory usage during the sample week:

|  |  |  |
| --- | --- | --- |
| MEMORY\_USAGE | Recorded once every 15 minutes and upon startup | Reporter path  Amount of memory used, in bytes |

Since memory usage was recorded at set intervals and upon startup, there was no way to find out exactly how much memory was used at the moment that a user opened more tabs. However, I was able to look at the average number of tabs each user had open and the average memory usage recorded for that user. Since these averages are linked to specific user ids, I then created a scatter plot that showed the average amount of memory usage for each Firefox user compared to the average number of tabs they had open during the sample week. The chart on the right shows the results. As the R² value of .2884 indicates, there is a correlation between these two variables. This is not a perfect way to measure this since there are things beyond the number of tabs somebody has open that can impact their overall memory usage, but this is a large number of users and it is unlikely the correlation shown at right is a coincidence.

At this point, I wanted to check and see if interacting with bookmarks had an impact on memory usage by looking at the average number of bookmarks interactions and average memory usage each user had recorded. The results on the right show that these two things are not connected. The R² value of .0205 indicates very low correlation between interactions with bookmarks and memory usage.

*Recommendations*

After analyzing this data, I recommend Firefox focus on increasing support for tabbed browsing. Non-primary users (who are potential primary users) use tabs in higher numbers than primary users, and using lots of tabs means using lots of memory. Firefox should focus its efforts for the next version on reducing the amount of memory used to run additional tabs, which will improve system performance. It is likely non-primary users will respond positively to this. Firefox can also promote the use of bookmarks as an alternative to tabs since they do not have an impact on memory usage and accomplish a similar purpose (since they are both ways for users to save things they want to look at later). By focusing on improving computer performance during multi-tab browsing, Firefox can provide a smoother browsing experience for all users and attract some new primary users in the process.