Google Data Analytics Capstone Report

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Feb 20th 2024

Business Report: Analysis of Wellness Smart Devices

For an in-depth analysis with the code used in this report, please refer to this Kaggle notebook.

Business Task

We address stakeholders/co-founders Sršen and Mur's interest to make informed decisions to grow Time's presence in smart devices. With the current lack of information for Time's effectiveness, we will harness existing data from other similar fitness brands to understand how consumers use them and apply the insights to Time. By making data-driven decisions, we can act with a confident strategy to improve the market for Bellabeat's smart devices.

The following business tasks/questions will guide our analysis:

1. What are some trends in smart device usage?
2. How could these trends apply to Bellabeat customers?
3. How could these trends help influence Bellabeat marketing strategy?

Data Sources Used

The data used is from CC0: Public Domain which originated from public Fitbit data consisting of 14 different datasets with maximum 2+ million observations.

Cleaning/Manipulating Data

Aside from converting the format of Date/Time columns to import into BigQuery without errors, there were no other cleaning or manipulation of the data. Wide formatted tables were not used in this step or future steps.

Narrow tables were checked for nulls, errors, and mismatched data types and none were found except the Fat value in the table recording weight and duplicates in the table for sleep data. Since there were only 2 valid values in all of the 60+ rows, we decided to remove that field as a feature as it would not give any significant data. There were three rows of duplicate values in the sleep_day table that were removed from the total 413 rows.

When finding relationships between the tables, we found that the daily-related data was just columns split from the main table, daily_activity. To remove redundancy, daily_calories, daily_intensities, and daily_steps were not included in the rest of the analysis.

Analysis

The original data sets organize recorded observations in a great way to perform analysis on it. The only changes made were aggregations to analyze different hourly recorded activities. I was surprised to see that the average total daily steps was 7638 steps. The average steps per day for a U.S. adult is 3,000-4,000 per day, and the suggested number of steps is 7,000-9,000 (9,00- for younger adults).

Similarly, the average calories burned in a sedentary day ranges from "2,020 calories (men)/1,559 calories (women)" for those in their 20s to "1,680 calories (men)/1,300 calories (women)" for people in their 80s. As the average total calories burned for each day is 2304, the average Fitbit user is burning more than the average sedentary American.

On the flip side, the recommended hours of sleep is 7 or more hours, but the average minutes of sleep Fitbit users get per night is 6 hours and 59 minutes including naps, just a little under the recommended hours.

Of the people who logged weight and other measured values (fat %, BMI, etc), ~ 39% of records were manually added into the app. **Caveat:** *as there was a very small number of observations (67), this is not a very accurate ratio of the Fitbit user population.*

The average calories burned and steps per day is lower on the weekends versus the weekdays (2421 calories on the weekdays versus 2204 on the weekends, 7986 steps on the weekdays versus 7182 steps on the weekends). Interestingly, the average total intensity of exercise is the same for weekdays and weekends (both 13.1)

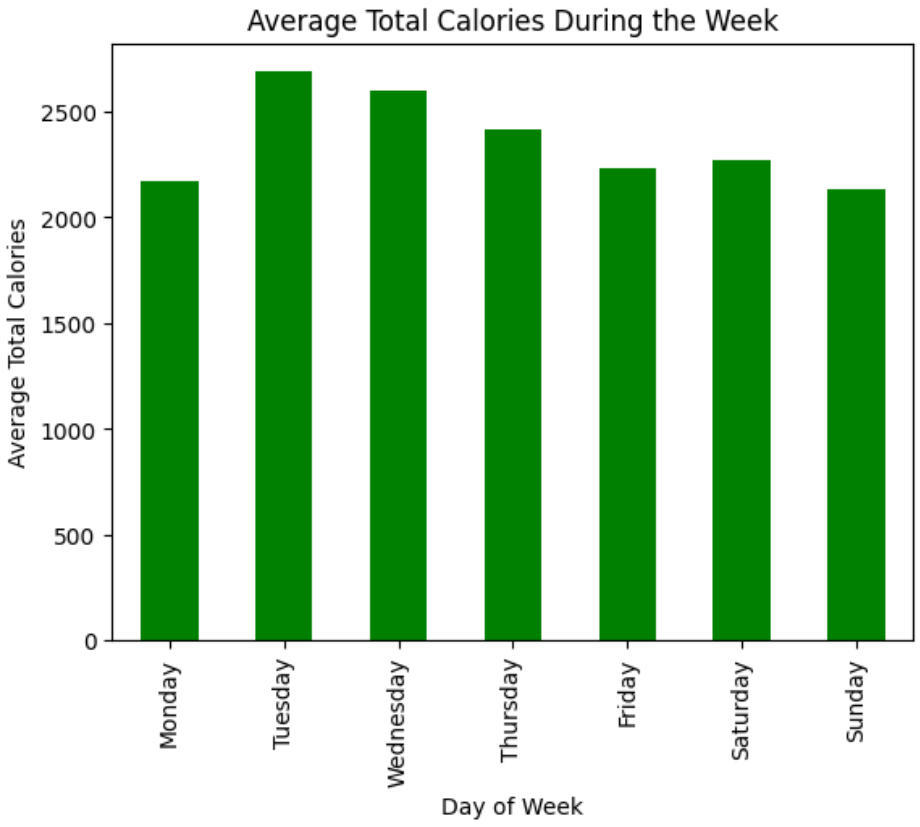
Average total steps and calories burned throughout the day is highest during the afternoon (noon to 6pm), but the difference to morning and night is not by much (< 100 calories, < 1000 steps)

Key relationships and patterns in relation to time are visualized in the next section.

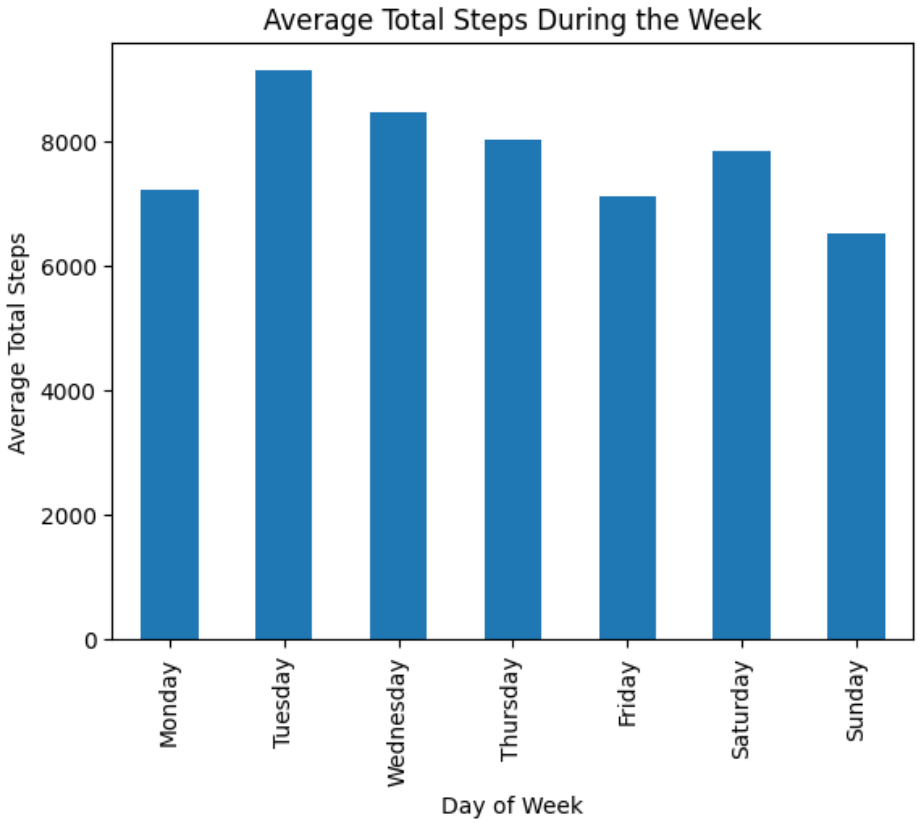
Key Findings

Now that our data is properly formatted, we import the original data tables and joined tables to Python to create visualizations.

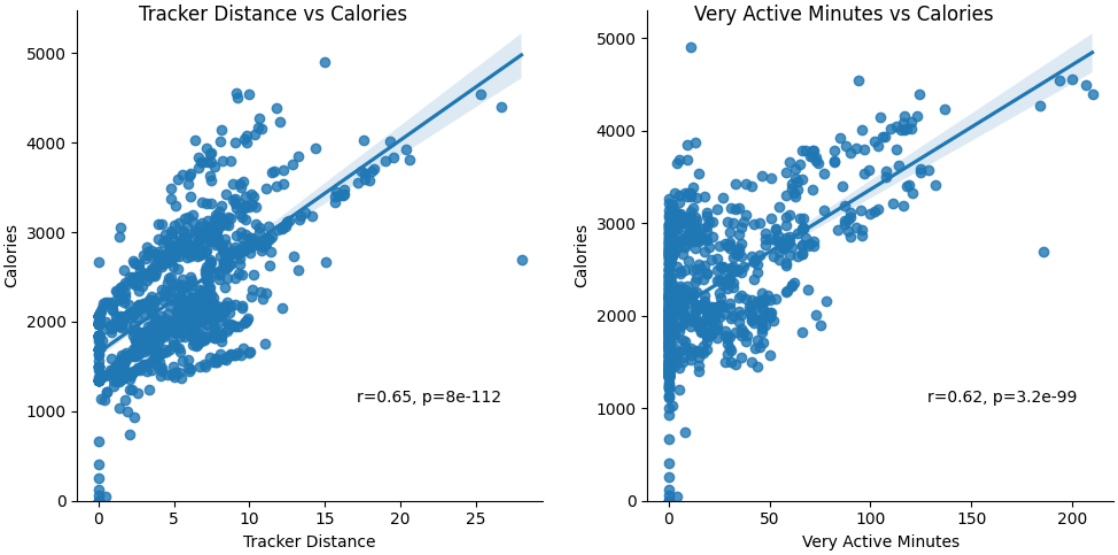
We first analyze the recorded average daily calories burned, steps walked, and exercise by Fitbit:



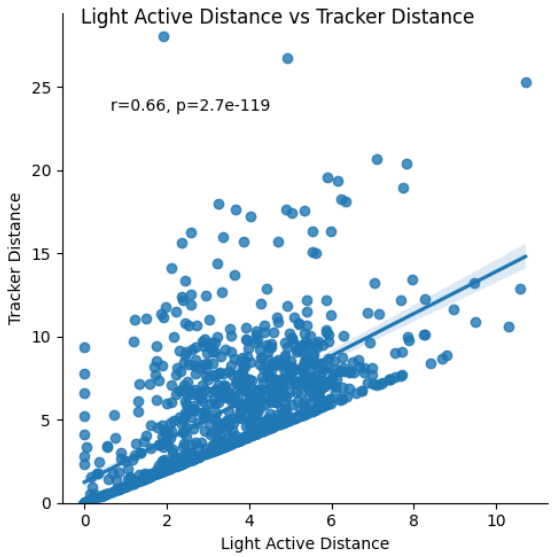
As seen in the bar graph above, calories burned is highest Tuesday then Wednesday and is surprisingly lowest Sunday then Monday (closely followed by Friday).

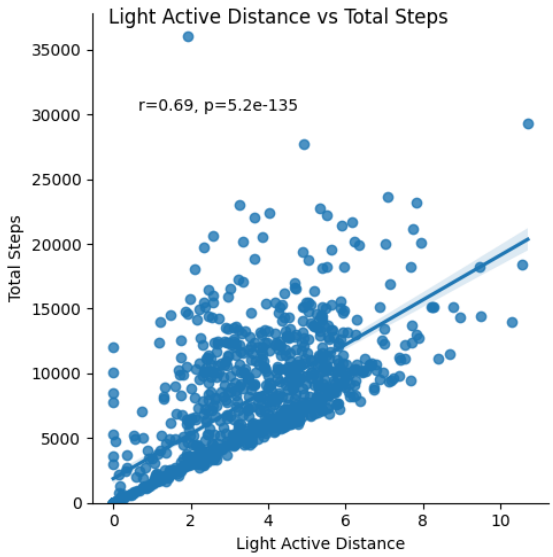


Similarly, the average total steps during the week is highest Tuesday then Wednesday and is lowest Sunday and Friday (closely followed by Monday).

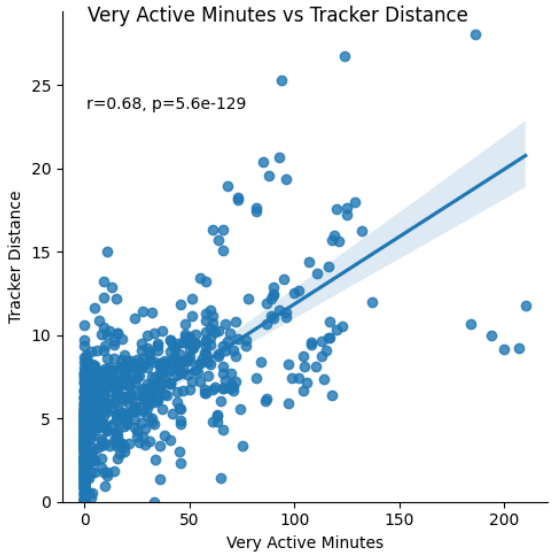


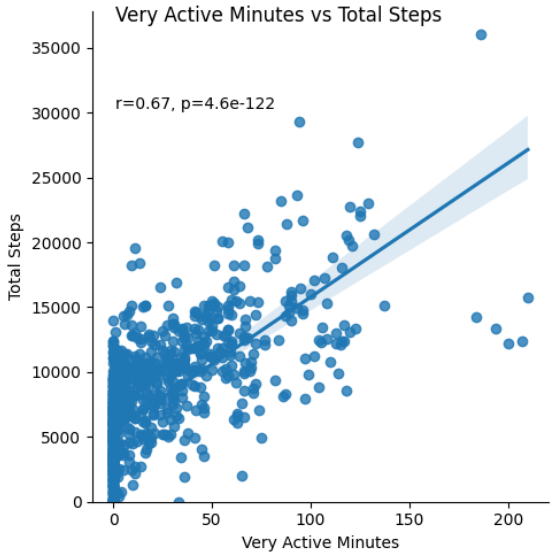
In the two scatter plots above, there is a slightly positive relationship with calories and tracked distance/very active minutes, where the longer someone is very active or travels more distance, the more calories they will burn.



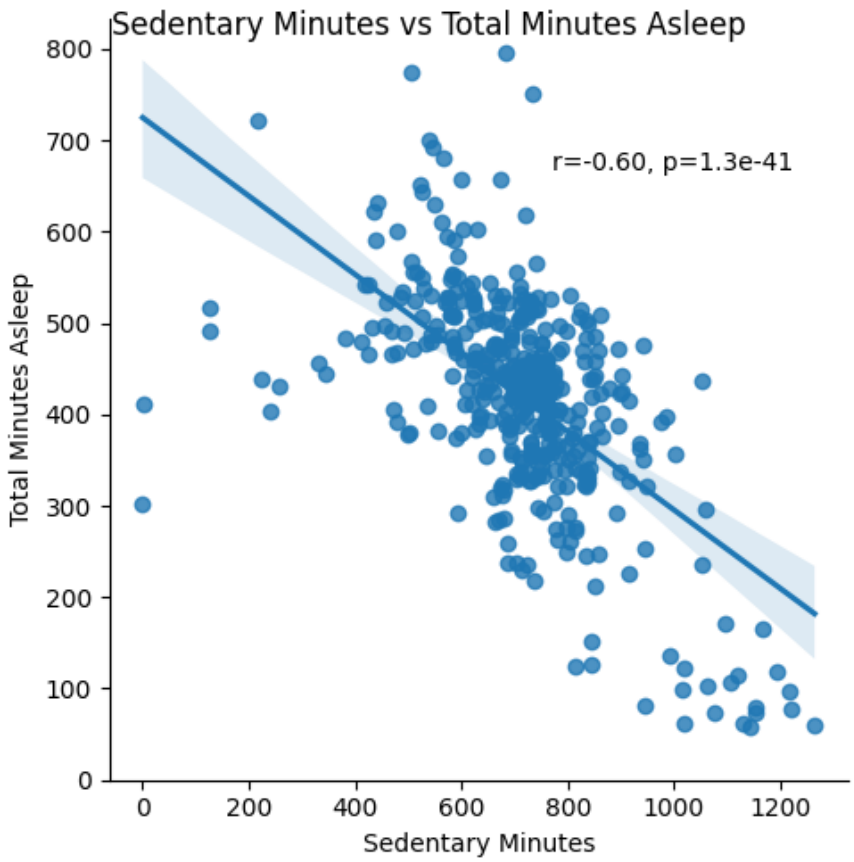


In this pair of scatter plots, they show a stronger positive relationship where the more distance traveled doing light exercise will increase total tracked distance and steps.





Similarly, the more minutes spent doing very active exercise, the greater total steps and tracked distance. Both this pair of plots as well as the previous pair with light activity shows that, regardless of doing a lot of very active exercise or light active exercise, you will also gain many total steps and distance.



Meanwhile, there is a negative correlation in these features, where the more minutes spent in sedentary activity, the less minutes are spent sleeping for the night.

Caveat: *when joining sleep and daily activity data, there was less sleep observations (not a complete 1-to-1 match of observations for sleep and activity), so sleep vs activity analysis is ~50% of activity observations*

Reccomendations

Our final conclusion is that the average Fitbit user is more active than the average American adult and generally gets above the daily required steps and calories burned. The main purpose of users purchasing health-focused smart products is to maintain or increase the user's health. We can utilize existing Bellabeat products to target places the average user is lacking to increase their overall health and therefore their satisfaction in the product.

From our analysis above, we believe that there are sever possible paths of action:

Since the average Fitbit user is more active than the average adult but does not get the required hours of sleep, there could be a greater focus to increase average hours of sleep. Alerts could be set near their set bedtime to remind them to start winding down. Alerts could additionally be set when a user is spending too much time in sedentary activity, encouraging them to move around. Alerts can be sent on the Bellabeat app as well as send vibration notifications to the Leaf and Time products. Fun facts, such as the relationship between sedentary time and sleep time can be included in the Bellabeat membership. Comparisons to the average healthy adult and their daily measurements can also be made in both the Bellabeat app and membership to motivate users to meet the "healthy" threshold.

As many users for Fitbit manually enter their weight data, it could be possible to address a way to automatically add their weight and fat data to the app (Bluetooth/WiFi). Bellabear could even consider creating our own

smart scale that measures weight, BMI, fat %, water mass, etc. that sends the measurements to the app automatically.

If users have a specific goal, (daily step goal of 8k, 2.5k calories burned, 3.5 miles traveled, etc.), Bellabeat can balance notifications through the app and worn devices to be more active on the weekends and Mondays and less on the other days. This would target users when they are less active. Through the app or membership, we can provide additional encouragement while the user is active to push for more time/distance, as it will increase calories burned, total steps, and overall distance.

All of the above can be emphasized in marketing as it addresses current lacking areas in Fitibit, a competing brand. An example of dialog could be focusing on Bellabeat's app and membership which will give the users personalized notifications and health facts to increase their activity, health, target goals, and sleep.