



# Marathonviz

Data Visualization Exam

BSDVDDMIKU

Ludek Cizinsky (luci@itu.dk)

3rd of June 2022



## Start | Introduction

Whether it is your first marathon or 100th, it will always feel special. The reason why this race is so unique is the fact that one can not simply run it without preparation. In May of this year, I have run my second marathon which led me to the idea of visualizing my experience. My hope is that I provide insights to experienced runners while also keeping the non-runner audience engaged by my personal commentary. You can find the visualization at [www.marathonviz.run](http://www.marathonviz.run). In case of a problem accessing the website, please let me know.

## 6th km | Data, Communication goal, Technique

### > Data

My data came from Strava which is a social media platform that enables you to log your sporting activities. For a runner, there are two core metrics to look at: [pace per km](#), [avg heartbeat per km](#). These were easy to extract from Strava's API since they were reported for each of my kms. In addition, I decided to use map data which were encoded as latitude and longitude every few seconds. The challenge was to figure out the distance between two coordinates. This was needed in order to highlight particular segments on the map. I ended up using [Haversine formula](#) which also accounts for the curvature of the Earth. All the needed preprocessing has been done using [Python](#).

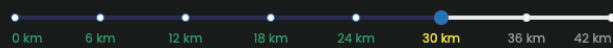
### > Communication goal

My primary target audience are runners of varying experience. For this audience, I assume the knowledge of the key running metrics mentioned above. My goal for this audience is to provide them with key insights from my run such as what happens when you do not stick to your planned pace. As a secondary audience, I consider people interested in giving a try to running. I assume no prior knowledge for these people. Here the goal is to give them motivation as well as provide them with basic advices.

### > Technique

Since marathon run is a complex thing to visualize in one figure, I decided to use a [dashboard](#). This allowed me to show high level trends as well as have users explore things in more detail. Since smooth interactivity was of high importance, I decided to use [Dash](#) and [plotly](#). (both python libraries)

Use the slider below to navigate through the whole marathon experience.



Feeling good Can barely talk Hurting

Status after 30 km: Can barely talk

After the half marathon mark, I started to think quite a lot about how many kilometers are left, in fact, this is a good way how one can think of something else than the pain. I was quite nervous around 27th km mark as this was the furthest distance I ran during my training. As can be seen nicely from the figures, from this moment on, I only ran slower. Learning point: next time run at least 33 km as part of the training.

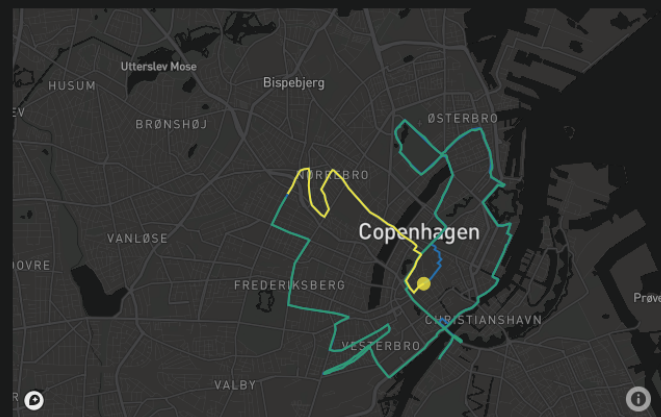
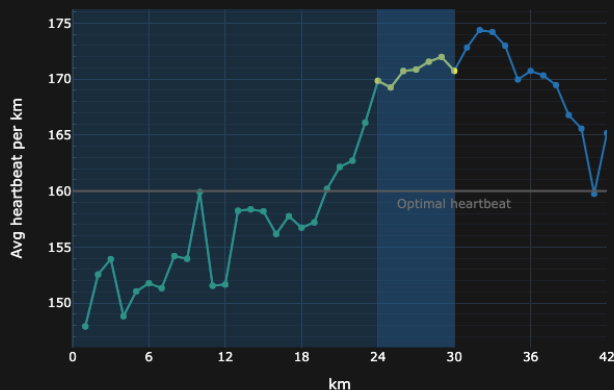


Figure 1: Main visualization

## 24th km | Main visualization discussion

**Layout.** The grid of the dashboard is divided into 4 equally sized tiles. The most important tile is in the upper left corner where I provide the reader with guidance. I decided to put tiles showing **pace** and **heartbeat** on the right diagonal in order to prevent reader from seeing these two subplots as similar. In addition, putting them next to each other might cause false sense of continuation. Finally, I put the least important element to the lower right corner. I determined the importance by my primary audience, i.e. runners, who care most about the two core metrics.

**Interactivity.** All figures in dashboard show high level pattern which is also complemented by my personal comments. If the reader wants to explore things more in depth, it is possible to zoom on a particular area in each figure. In addition, pace and heartbeat figures also provide detailed metrics if the reader hovers over a particular point.

**Color scheme.** I decided to use color blind friendly scheme introduced by Wong [2]. In addition, I used website from Nichols [1] to verify how the colors would like for a color blind person. **Blue** is the primary color which should indicate neutrality. **Green**, **yellow**, **orange** should then decode my state throughout the race. These colors are consistent across the figures and

were chosen such that they utilize human's associations, e.g. green means good. Last but not the least dark theme was used since I assumed my audience might view this visualization in the later hours of the day and thus it would not be pleasant for them to get hit by a white background. In addition, I believe dark also adds more dramatic atmosphere.

## 36th km | Pace and heartbeat figures discussion

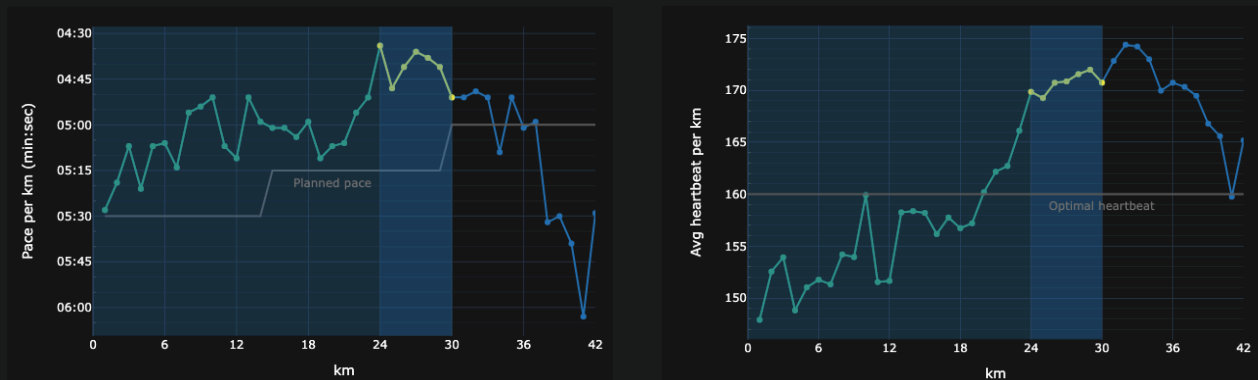


Figure 2: Pace and heartbeat figures

**X-axis.** Both figures are divided into 6km segments which correspond to the segments on the slider. The length was chosen because 42 is divisible by 6. In addition, 6km is a reasonable distance within which interesting things can happen, so I could comment on it.

**Y-axis.** Both figures have their y-axes truncated in order to provide readers with better detail of changes. Further, I highlighted the area of the plots about which my comment is in order to make the reader's life easier as well as to steer the attention. For a similar reason, I highlighted the past kilometers. In addition, I added grey lines that show optimal heartbeat and planned pace. These should provide additional interesting information. For instance, it can be nicely seen that not following my planned pace resulted in a slower pace towards the end. Overall, the data ink ratio might be low, but as a positive trade-off I believe I reduced the work required from the reader. Finally, y-axis for the pace are reversed. The logic behind is that if I **increase** my pace, it should go up and not down. Last but not the least, I did not round the heartbeat values since sometimes the difference between the two is very small.

## Finish | References

- [1] Nichols, D., 2022. Coloring for Colorblindness. [online] Davidmathlogic.com. Available at: <<https://davidmathlogic.com/colorblind/#%23000000-%23E69F00-%2356B4E9-%23009E73-%23F0E442-%230072B2-%23D55E00-%23CC79A7>> [Accessed 3 June 2022].
- [2] Wong, B., 2011. Points of view: Color blindness. [online] nature. Available at: <<https://www.nature.com/articles/nmeth.1618#citeas>> [Accessed 3 June 2022].