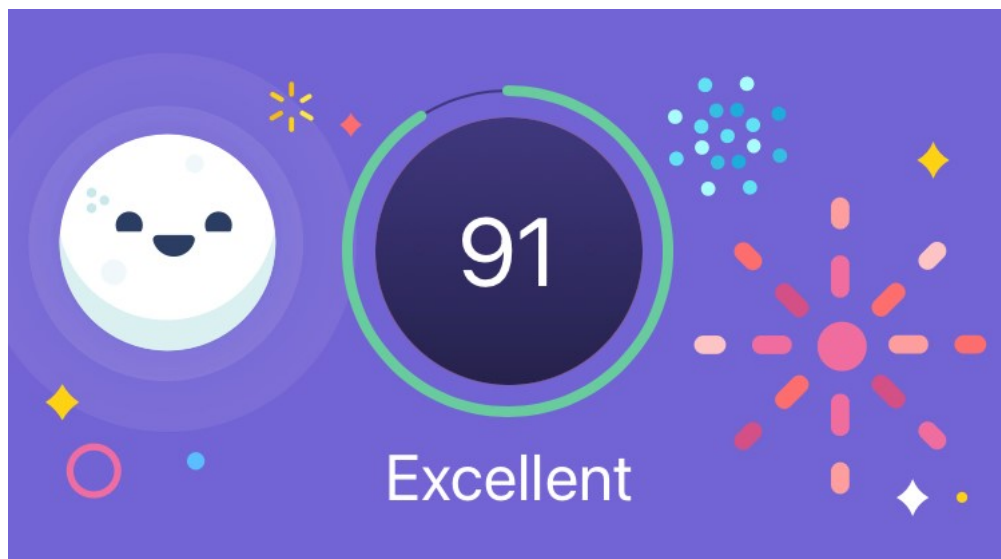# IT UNIVERSITY OF COPENHAGEN

Data Visualisation and Data-driven Decision Making

Fitbit Sleep Data

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4th Semester, Spring 2022
Data Science BSc

BSDVDDM1KU

1 Introduction

The Data and Audience

The data used for this visualisation was gathered over the past 2 years via my personal Fitbit tracker[1]. Tracking devices are a easy and popular way to monitor yourself and Fitbit alone claims to have 20 million active users (Fitbit 2022). I chose to use only the sleep data as I am interested in my sleep patterns, as I don't tend to sleep well, and also because it was one of the most complete datasets available. The largest period of sleep per day is considered the 'main_sleep' and only that data was used for these visualisations. The main audience for this project was initially myself, although it may be of interest to other Fitbit users and others.

Colour Palette

A number of colour palettes were experimented with. One priority was that the colours chosen were distinguishable, both for people with normal colour vision and those without. Another was to consider the colours that tend to be associated with sleep [2]. A google image search for 'sleep colour palette' brings up an ocean of blues and purples, veering into turquoise-greens and pinkish-reds. Lastly, I wanted to make a dashboard, and a daily view that would not look out of place to someone familiar with Fitbit's own interface. Fitbit's app's sleep section uses 3 shades of blue to denote the three levels of sleep, and a redish tone for waking hours. It also uses 2 purple shades in the backgrounds and for bar/line charts. With regards to these three, I decided to colour-match to the Fitbit app (app screenshots are in Appendix A).

Chart Choices

Two sets of visualisations were created for this data.

Firstly, a dashboard was creating in Tableau as an overview of wake up times, day of the week, and minutes spent asleep on average. This includes a heatmap and 2 complimentary bar charts to the top and right. A slider was included to change the date range. Section 2 shows three screenshots, representing data from years 2020, 2021, and 2022. These were chosen as they show how my wake times have changed from one year to the next, and gives an insight into correlation between wake time and quantity of sleep.

Secondly, a visualisation was created as an alternative to the day view given by the Fitbit app. For this, the sleep stages were shown on a clockface. A sample day is shown in section 3. I find analogue clocks intuitive, although possibly younger users may not. One drawback in this design is that it relies on our ability to judge angles, and often this isn't the most accurate (Cleveland and McGill 1984). Using different heights could also be considered disingenuous; the deeper sleep sections could be judged as smaller than they represent. Bringing all the sections to the same height however looked flat and unappealing, so this was an aesthetic choice. Ideally, this would be part of an app interface, where the specifics could be given when the section is touched by the user, so needing exact judgements wouldn't be necessary. The Fitbit app also offers a bar chart showing the total time spent in each stage. As an alternative, I used a treemap for it's ability to show 'part to whole' relationships (Tableau 2022). A second version was also created to provide 'details on demand', which subdivides each section by the blocks of sleep (see flourish link under visualisation).
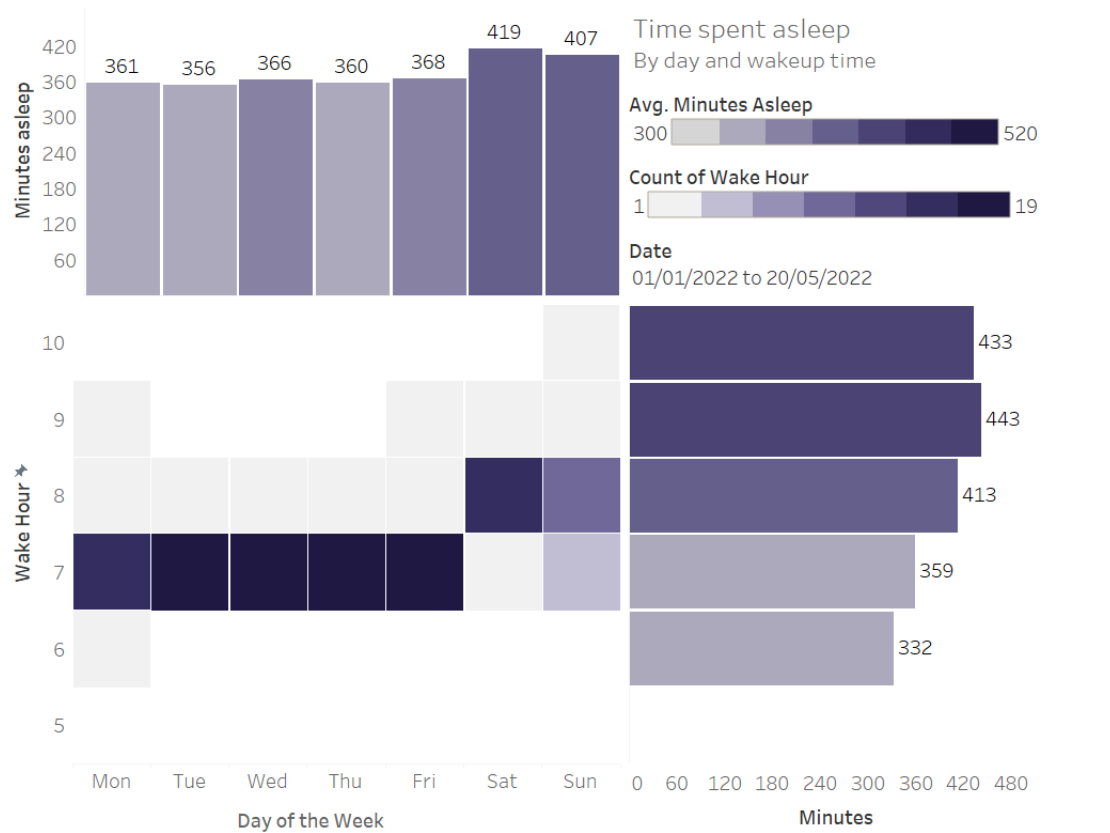
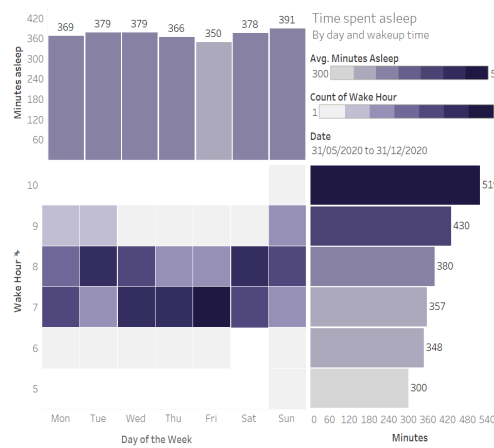---

[1]Device: Fitbit Inspire HR

[2]in my western culture.
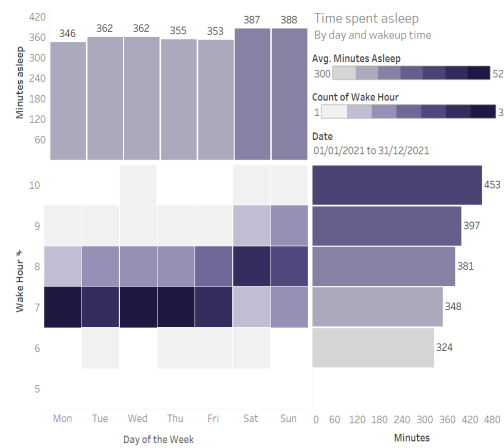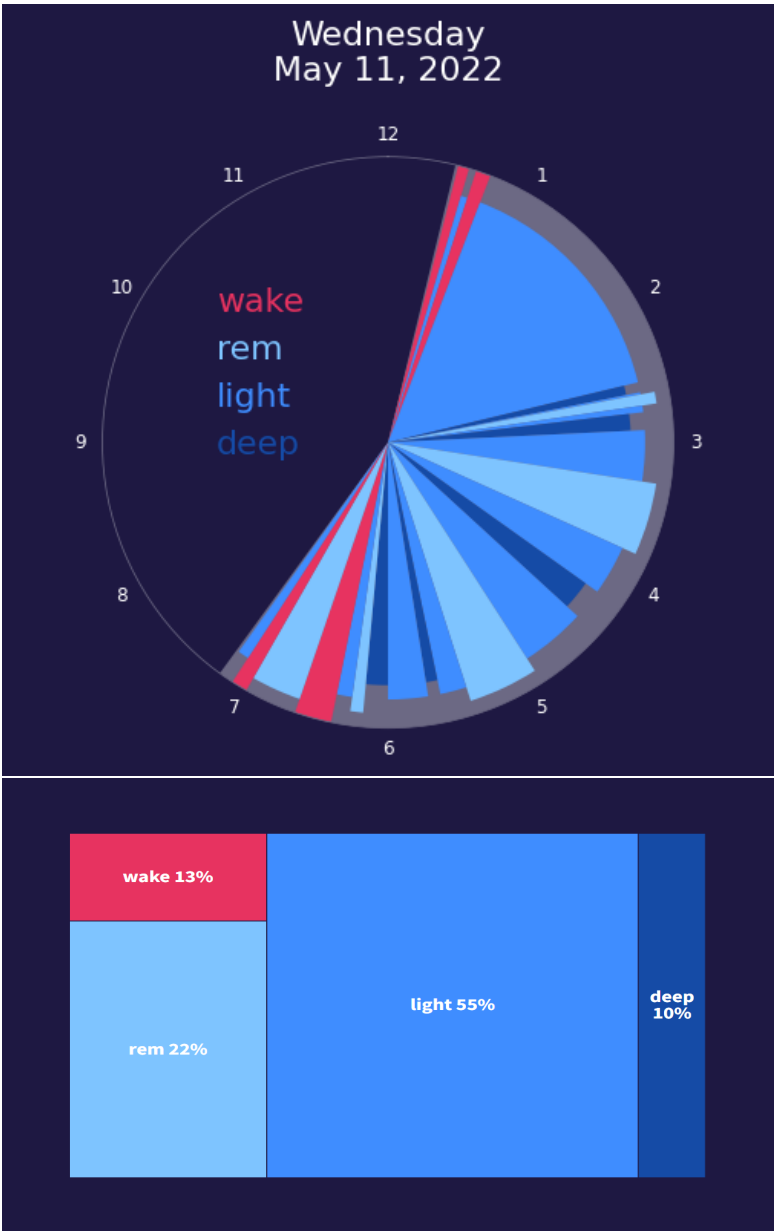
2 Dashboard

2022 Dashboard

2020 Dashboard
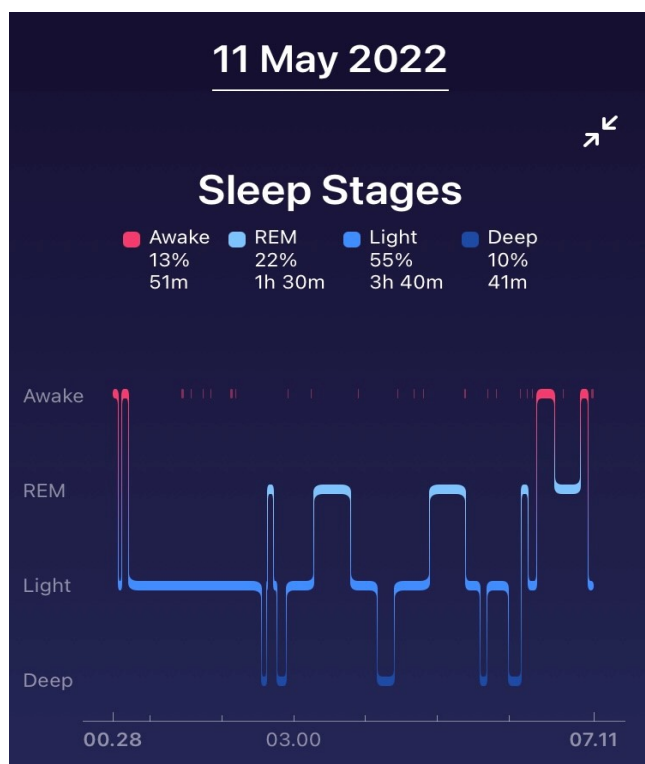

2021 Dashboard

3 App view

Flourish Stages

References

Cleveland, William S. and Robert McGill (1984). "Graphical Perception: Theory, Experimentation, and Application to the Development of Graphical Methods". In: *Journal of the American Statistical Association* 79.387, pp. 531–554. ISSN: 01621459. URL: http://www.jstor.org/stable/2288400 (visited on 01/30/2019).

Fitbit (2022). *Fitbit SDK*. URL: https://dev.fitbit.com (visited on 06/01/2022).

Tableau (2022). *Treemaps*. URL: https://www.tableau.com/data-insights/reference-library/visual-analytics/charts/treemaps (visited on 06/01/2022).

A   Fitbit app screenshots

Figure 3: fitbit app view