

Sleeping algorithm:

During the final meeting with our client we presented our Idea of calculating the Ideal value to present sleeping quality to our users. We as a team and the client agreed that the topic is out of our specialization scope and we decided to meet an expert that was recommended by Mr.Kisjes the expert is Mirjam Mulder a specialist in sleeping problems at “Sens Beweeegt je”.

Data before the meeting:

- Before having a meeting with the recommended expert our team had successfully collected multiple variables from the smartphone that include the following:
- Usage time before sleep.
- Sleeping time.
- Stress level :
 - was calculated using a basic function that monitors time between locking and unlocking the device to show that the user is expecting or waiting for something which will simulate stress or anxiety.
- Sleeping interrupts.

The meeting:

During the meeting Mrs.Mulder presented several examples of sleeping problems and very important factors to be considered while designing an algorithm to analyse sleeping quality. Unsurprisingly the analysis process was too complex to implement and it was almost impossible to create such an algorithm using automatically collected data without having a conversation and asking multiple questions to the user that were created later in the meeting.

Moving from our intro we asked the expert to analyse several virtual examples that we provided the data for, the process was discussed during the analysis, then we asked the expert to assign a weight for each variable and question.

Data after the meeting:

After the discussion with the expert the following data is used in order to calculate a grade for sleeping quality.

Variable	weight
<i>Usage time before sleep</i>	7
<i>Sleeping hours</i>	8

<i>Stress level</i>	10
<i>Psychological state</i>	8
<i>Productivity</i>	8
<i>Energy at waking time</i>	6
<i>Need of power nap</i>	6

According to Mrs.Mulder the result is not scientifically accurate because more data, observation, and personal questions should be asked to the user to come up with an accurate result that could be used in medical forms, but it is considered accurate when used as a preliminary test.

The algorithm:

In the following table the used variables, their weights and the calculation of final value are described:

Variable	weight	Collection method	Final value
<i>Usage time before sleep</i>	7	automatically	Multiply by 0.7
<i>Sleeping hours</i>	8	automatically	Multiply by 0.8
<i>Stress level</i>	10	User dialog traffic light method	Divided by input value
<i>Psychological state</i>	8	User dialog traffic light method	Divided by input value
<i>Productivity</i>	8	User dialog traffic light method	Divided by input value
<i>Energy at waking time</i>	6	User dialog traffic light method	Divided by input value
<i>Need of power nap</i>	6	User dialog traffic light method	Divided by input value

Results:

Value of usage time before sleep is determined in the research done earlier could be found in canvas in duo research report Hussam & Julian.

Average sleeping hours was determined at a grade of 10 by Mrs.Mulder to be 8 hours for our target group.

The reset of the variables are registered through an interactive dialog by the user.

The sum of the values calculated as explained in the table above is divided by 5.3 resulting in a grade on a scale from 0-10 that represents sleeping quality.