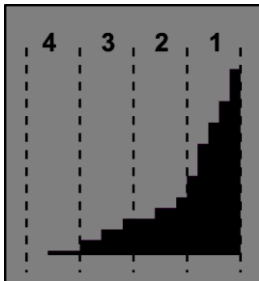
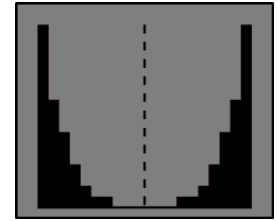


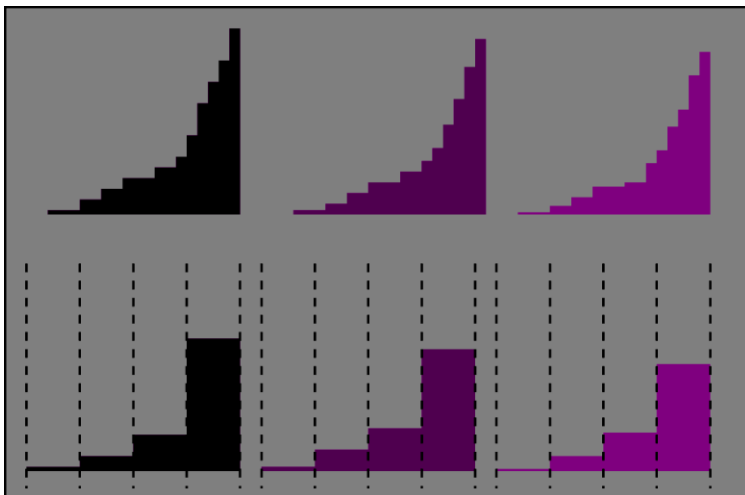
Analyzing the output

The output of the FFT-function gives us a mirrored set of values. For this reason, we decided to take only half of the values into account for analyzing the user's action. Yet these are still a lot of values, playing around with bigger array sizes for the FFT interval (1024 and above) we had memory issues due to the broadcast of the values from the background service to the activity, so the final size of the array would be 256.



To keep the memory usage low from here on, the code does not store the whole sequence of values, but divides the chosen half of the FFT- interval into 4 smaller chunks. For each of the chunks the average is calculated, providing us a very rough frequency overview that could be stored in larger numbers.

So instead of saving 256 (or actually 128) values per sensor update, the application does only save four. This kept the lag of the running rather low and still provided enough data to analyze the user's movement over time.



This output was now tested in different situations. Putting in additional sensors was unfortunately not possible due to time and memory issues. So we made the best of it and prepared a little "lab test", in which we connected two test persons (ourselves) equipped with the mobile device via USB extension cables with a computer. This allowed us to measure movement values per debug output and get some samples on different types of movement. These measurements were then hardcoded into the application to provide the proper notifications. An interesting observation was, that there were small differences between the value of our female and our male proband. Usually the values of the female test person were smaller than the values of the male test person, even though they had almost the same size. For the application we used the maximum of the male measurements and the minimum of the female measurements.

Due to the fact that we had very local test conditions, some activities required a little improvisation to be measured. Still, we were able to gather movement data for several situations. Here is an overview of the results.

	1	2	3	4
Sitting	< 15	< 3	< 3	< 3
Walking	40 – 70	5 – 10	< 5	< 5
Running	120 – 210	15 – 30	5 – 25	5 – 15
Bicycling	20 – 25	< 10	< 3	< 3
Swimming	20 – 40	< 5	< 3	< 2
Rope Skipping	230 – 270	30 – 50	10 – 25	< 10 - 15

To ensure your happiness, here is a photograph of our professional test setup simulating swimming:



WTF?