MILESTONE 1, report about required visualizations

Group: 2

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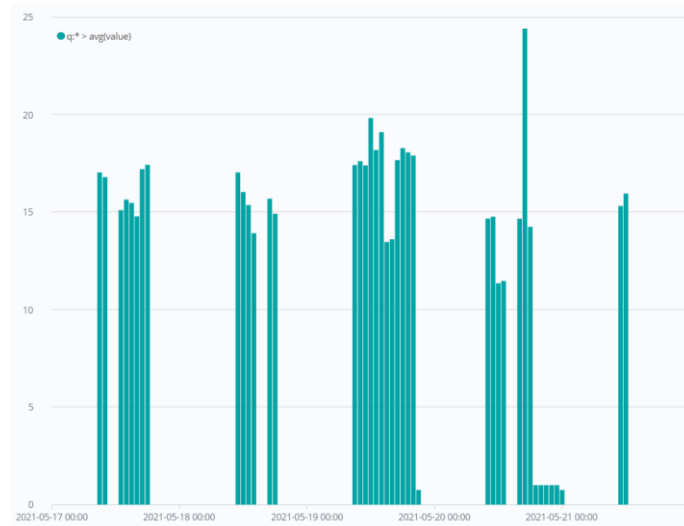
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Using timelion, we first visualised the data collected during the past week from 2021-05-17 00:00 till 2021-05-22 00:00. Figure 1 shows the average number of people in the room conducted by each hour.

Figure 1: Average Count of People in the Room

However, although important, this graph is not very representative in terms of reporting our observations and conclusions considering that just by observing it we cannot really tell much about patterns and trends in the data that may be crucial for any further data analysis nor it has essential statistical significance, so we continue our search for more appropriate visualisations.

On the Figure 2, we can see an average filling ratio of the room, taking into account that maximal number of people allowed is 30.
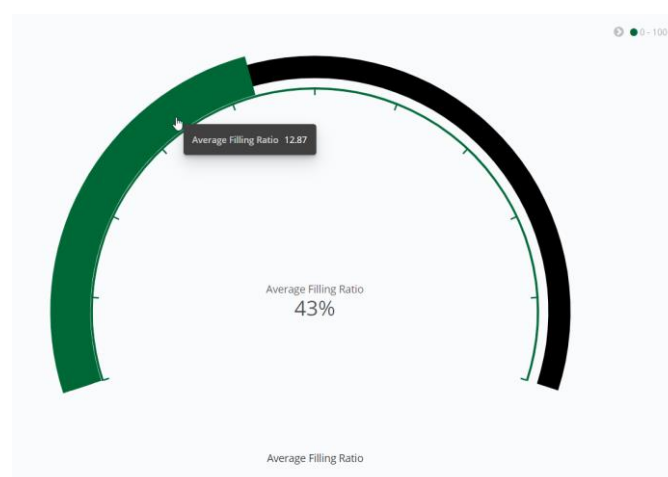


Figure 2: Average Filling Ratio

We can see that on the average the room is on 43% if its capacity. Again, is this representative? What does this tell us? According to this, average number of people in the room is approx. 13, but based on the previous visualisation we can tell that during the day it will most probably be between 15 and 20. It seems that we do have a few outliers that spoil the average (for example Thursday which can be seen on the graph, where we unfortunately lost an internet connection and the count stayed 1 for a few hours) Therefore, we go further into this and investigate.

On the Figure 3 is a heatmap, where we visualised the number of people in the room by hour for the previous week. Here we can see that the busiest hours are in the morning as well as afternoon, when the lectures are usually held.
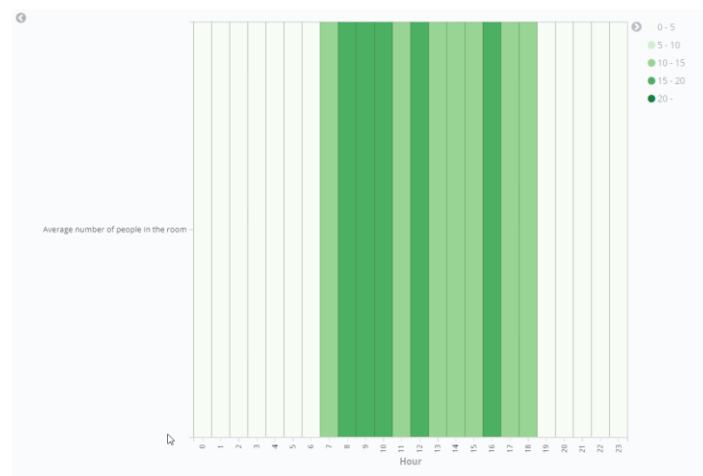
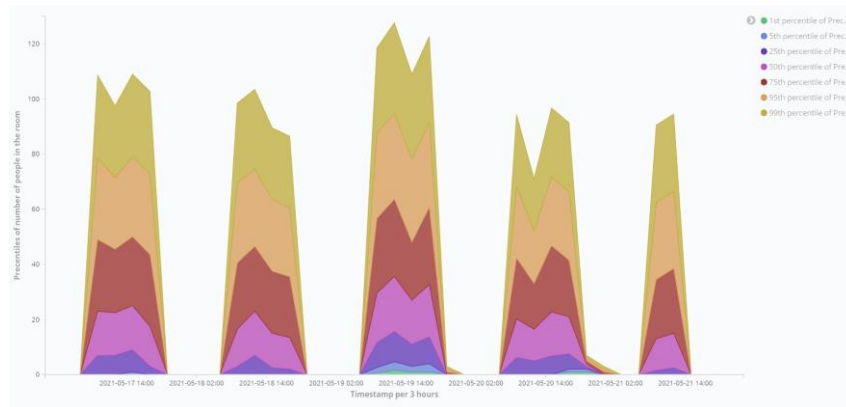**Figure 3:** Average Number of People in the Room per Hour - Heatmap

Since it tells us nothing about the real average count per hour, at least not until we slide over it, we made an additional graph (Figure 4) where it can be seen how the count changes over time. Usually, after 18pm there was no people in the room. Here we can clearly see an outliers we mentioned earlier.
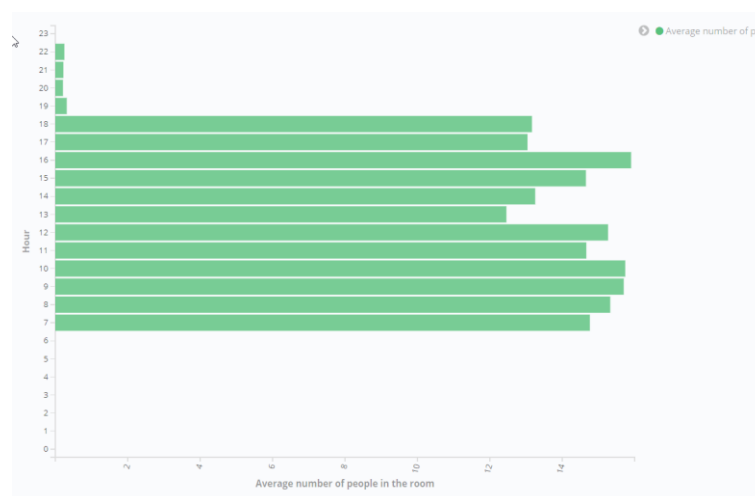
**Figure 4:** Average Number of People in the Room per Hour – Horizontal Bar

On the next three graphs, we tried to capture some of the metrics which are usually of a great significance in a statistical analysis.

First, we plot a percentiles (Figure 5). The most used one is 50th percentile or so called median value.


Figure 5: Percentiles of Number of People in the Room

Sliding over the highest median value on the graph, we can see that it was recorded on the Wednesday, which was the busiest day of the week, according to the first graph, and the median value is 20.
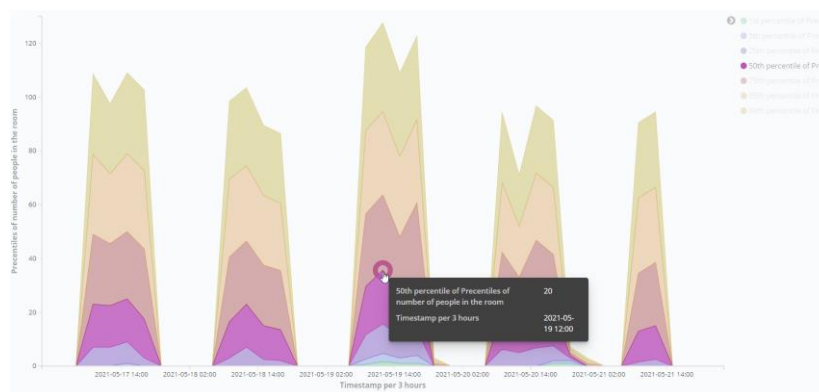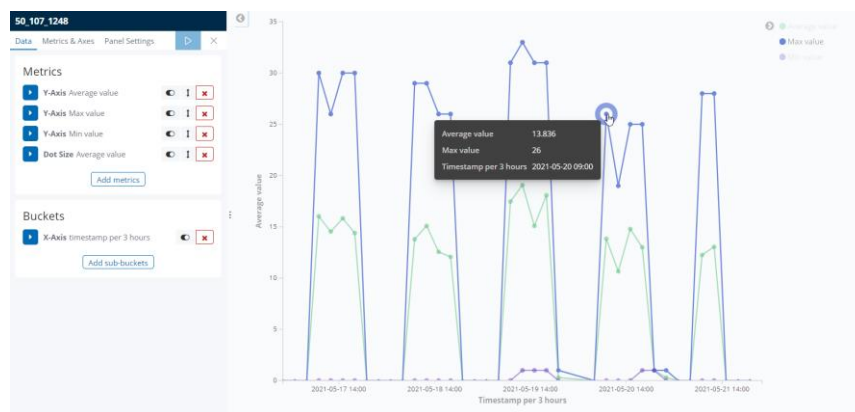

Figure 6: Sliding over Graph to Read Values

Then, we visualised average value along with the maximum value and the minimum value (Figure 7). For the dot size, we used average value, which can be seen on the Figure 8.
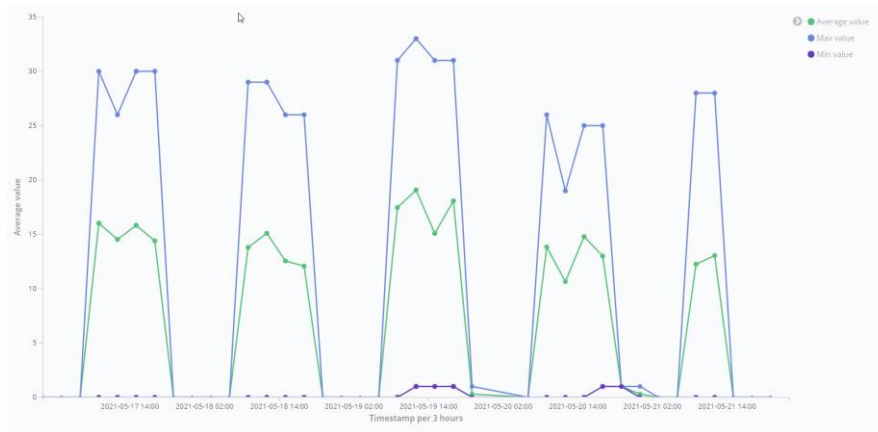
**Figure 7:** Average, Max and Min Number of People in the Room

Figure 8: Dot size Determined by Average Value

As we already said, another metrics of high importance is standard deviation. Figure 9 shows a graph which is very useful in terms of visualising the variance of our data. Here we visualised an interval plus/minus two standard deviations form the mean, and it can clearly be seen on which intervals our count varies the most.
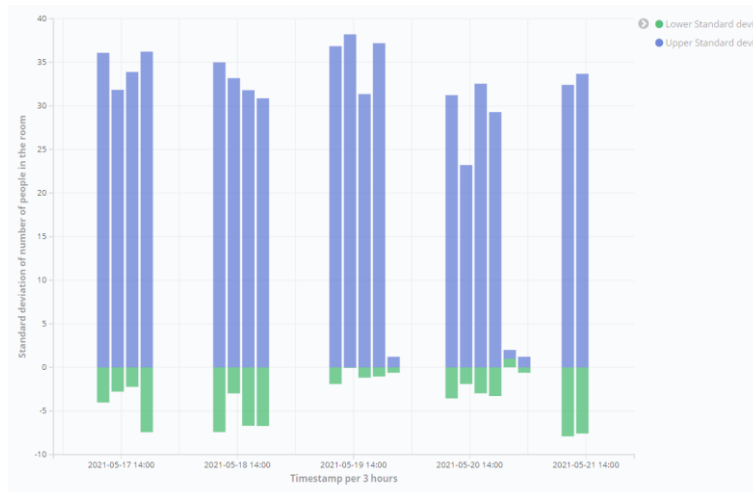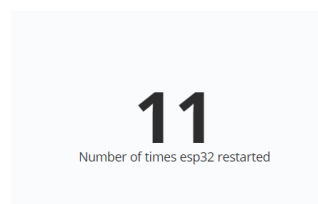
Figure 9: Standard Deviation of Number of People in the Room

After all being said, we made an additional visualisation of top 10 average counts of people in the room where size of the number corresponds to count value.
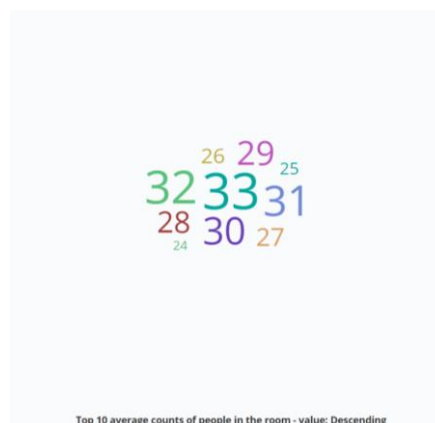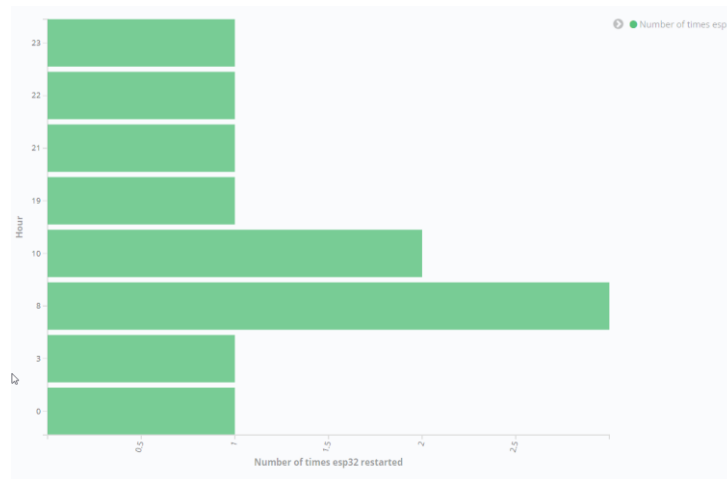

Figure 10: Top 10 Average Counts

As for the restart sensor, we first show the overall number of times esp32 restarted in the last week.

Figure 11: Number of Times esp32 Restarted

Then, we decided to look at the time (hours) during the week it occurred, to try to figure out what may be a potential reason behind it.

Figure 12: Number of Times esp32 Restarted per Hour

As we can see on Figure 12, it was usually restarted during the night, as we did it manually while working on our solution and improving it.