

Self-organizing map  
Juraj Mašlej  
Project2

**1. Implementation of SOM:** we used our implementation from lecture

**2. Parameters:**

Map size

We used different map sizes, mostly of square topology.

Metric

We had implemented 3 different metric functions on lecture, for project we choose to use  $l_{\max}$ .

$$l_{\max}(a, b) = \max(a[0] - y[b], a[1] - b[1])$$

Alpha, Lambda

As for  $\alpha_s$  we experimented with values between 0.2 and 0.8, for  $\alpha_f$  we used 0.01.

Regarding lambda, we used 0.1 for  $\lambda_f$ ,  $\lambda_s$  was dependent of map size,

$$\lambda_s = \text{metric}(\text{diagonal distance in map}) * 0.5$$

**3. Params used for graph-generating data:**

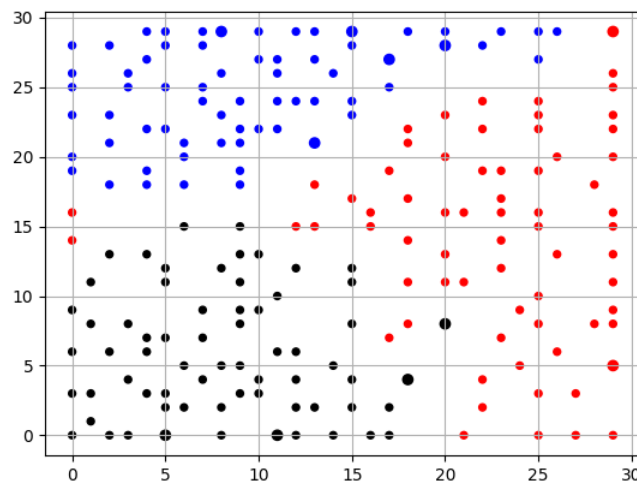
```
metric = l_max
epochs = 100
alpha_s = 0.7
alpha_f = 0.01
lambda_f = 0.1
```

**4. Graphs:**

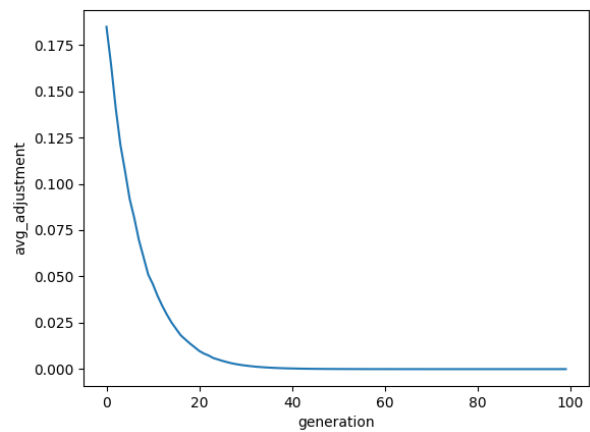
4.1. Counts

size = how many times neuron was activated

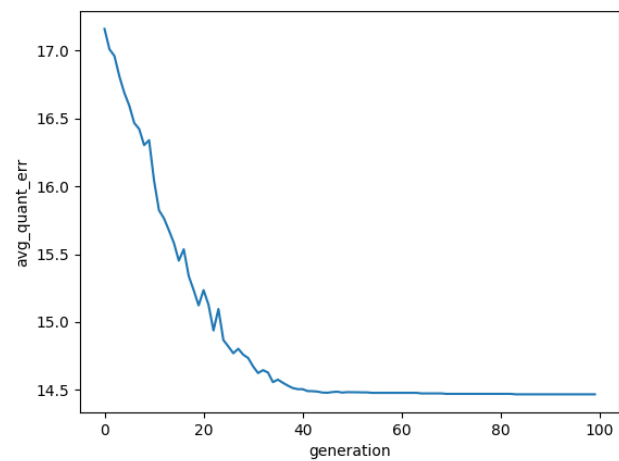
color = for which class of data is neuron being activated



4.2. Average adjustment of neuron positions per epoch

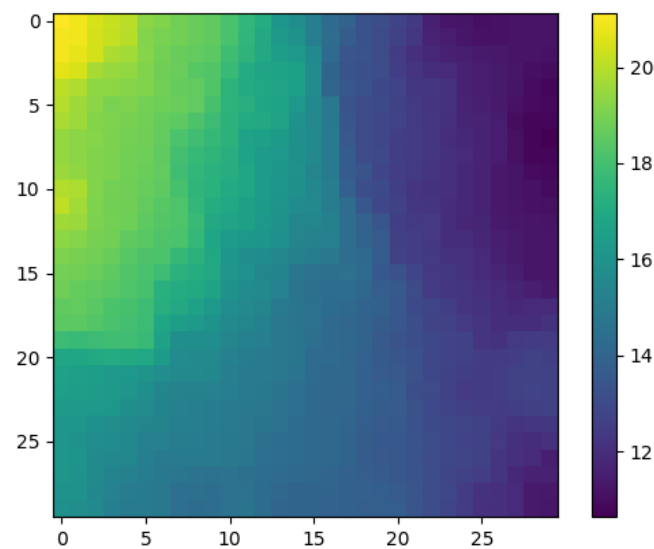


4.3. Average quantization error per epoch

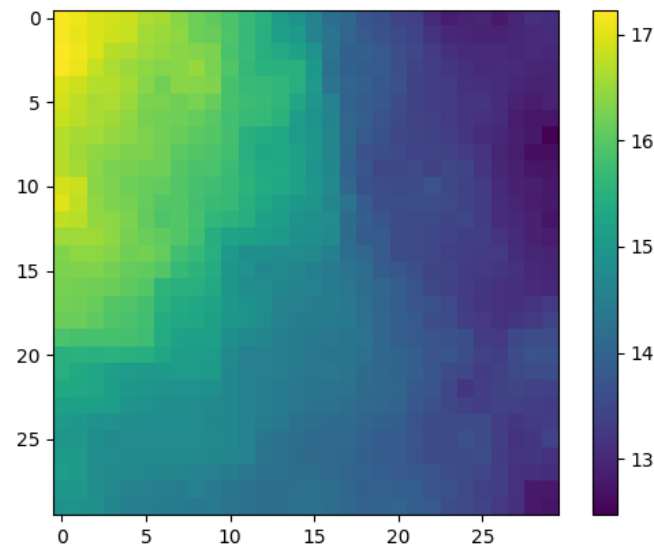


4.4. Heatmaps, sorted by attributes 1 to 7

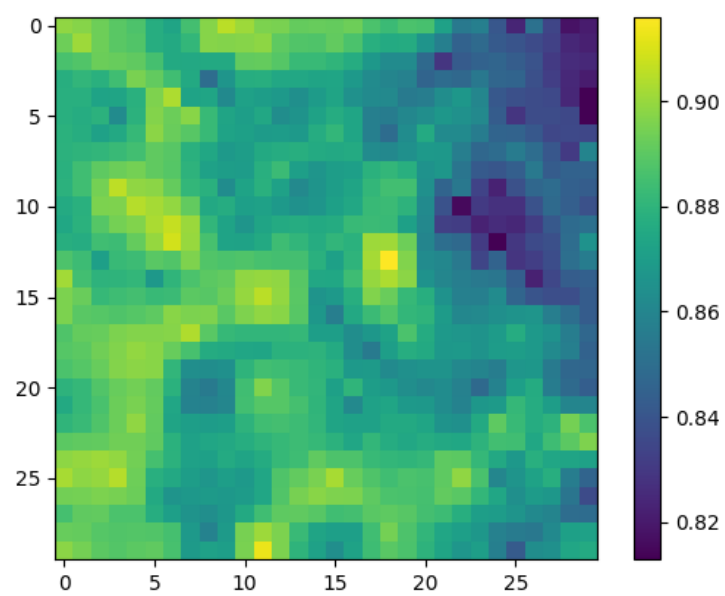
Heatmap for attribute 1.



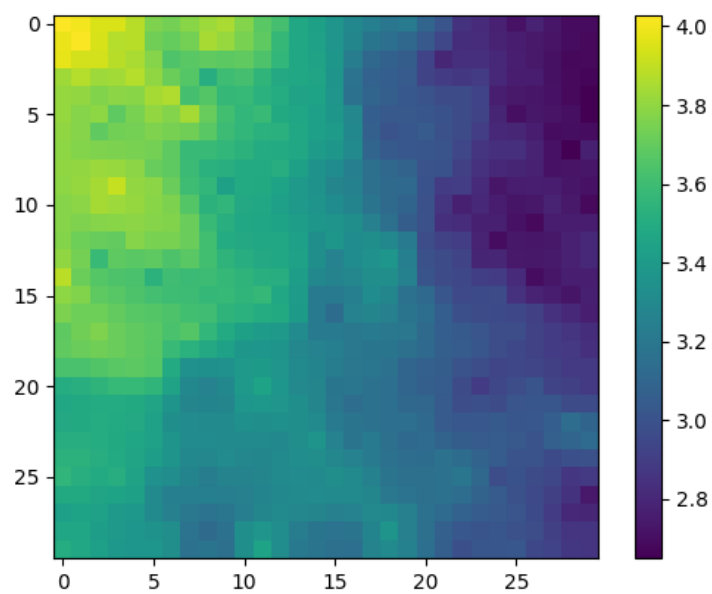
Heatmap for attribute 2.



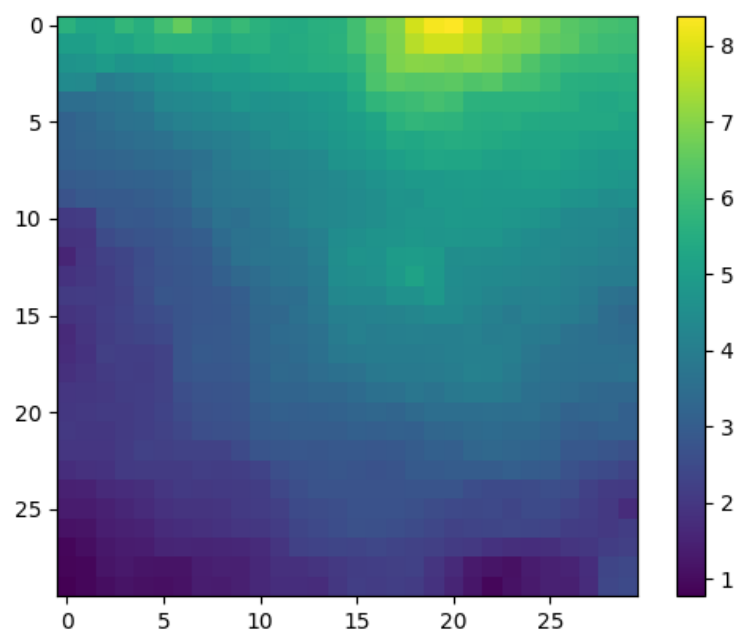
Heatmap for attribute 3.



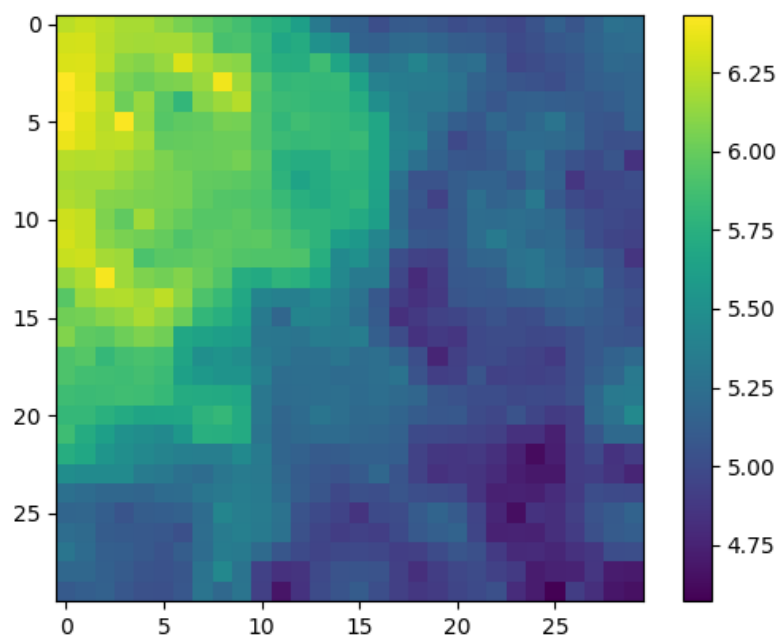
Heatmap for attribute 4.



Heatmap for attribute 5.

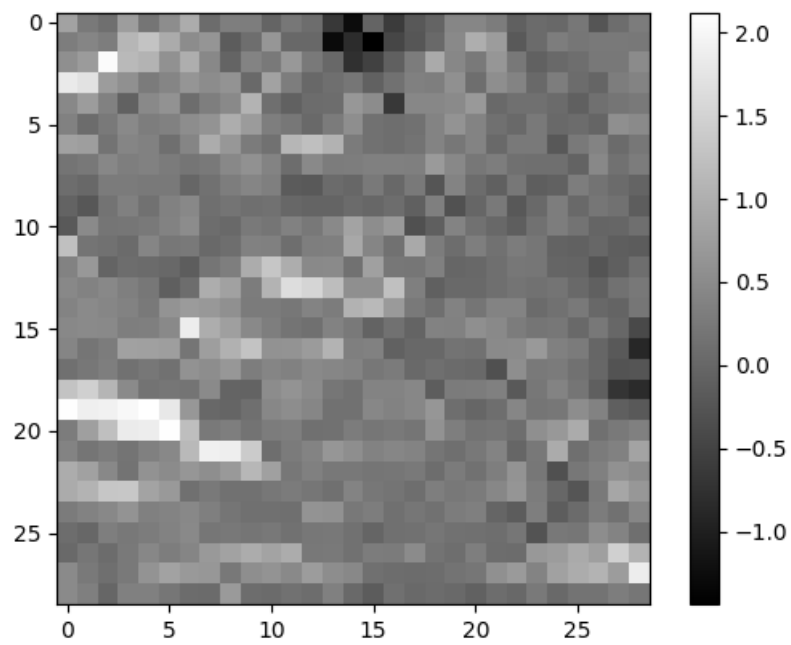


Heatmap for attribute 6.



4.5. U-matrices, horizontal and vertical

Horizontal



Vertical

