

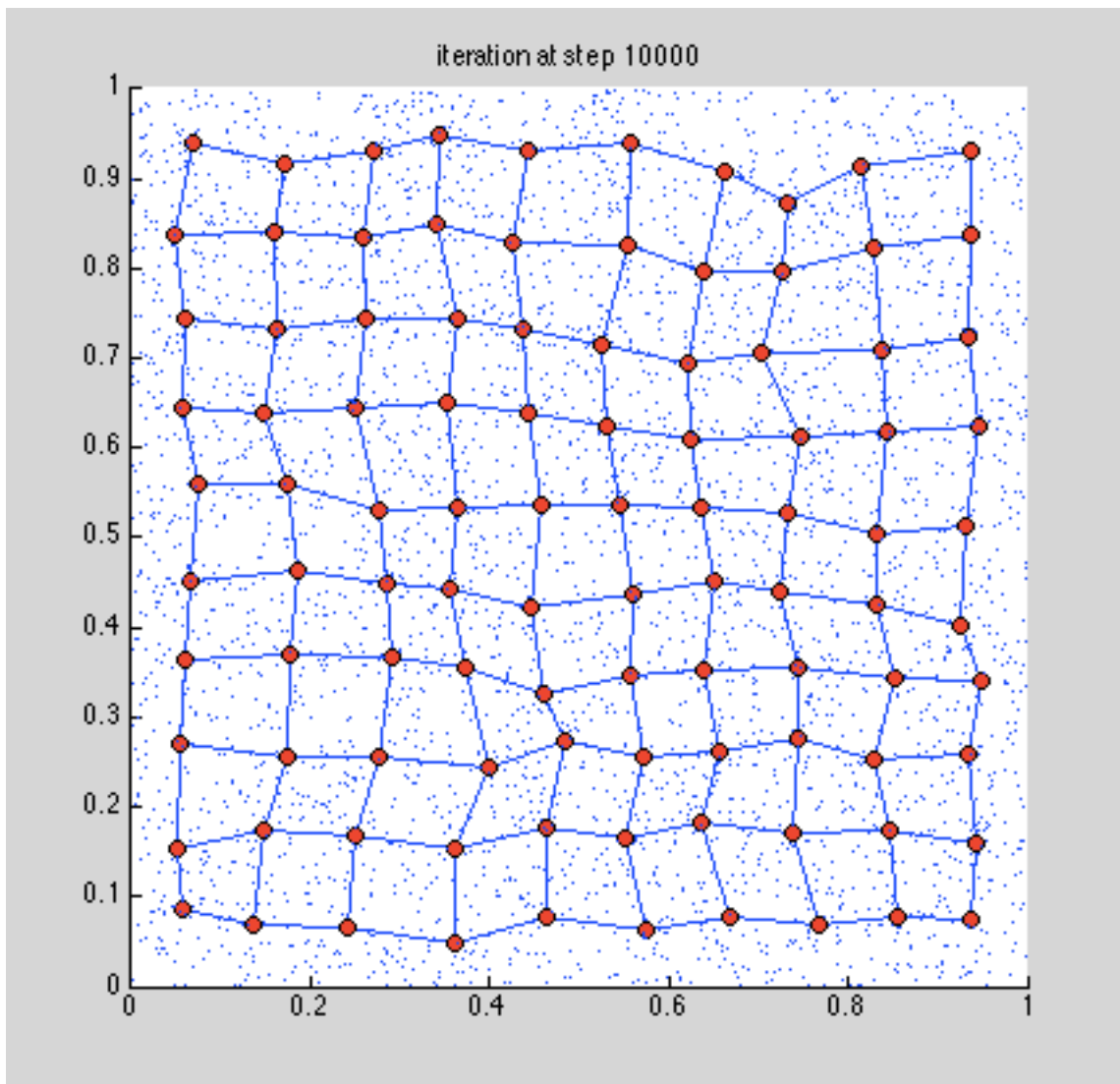
COMP502-HW07

Xihao Zhu xz36

P1.

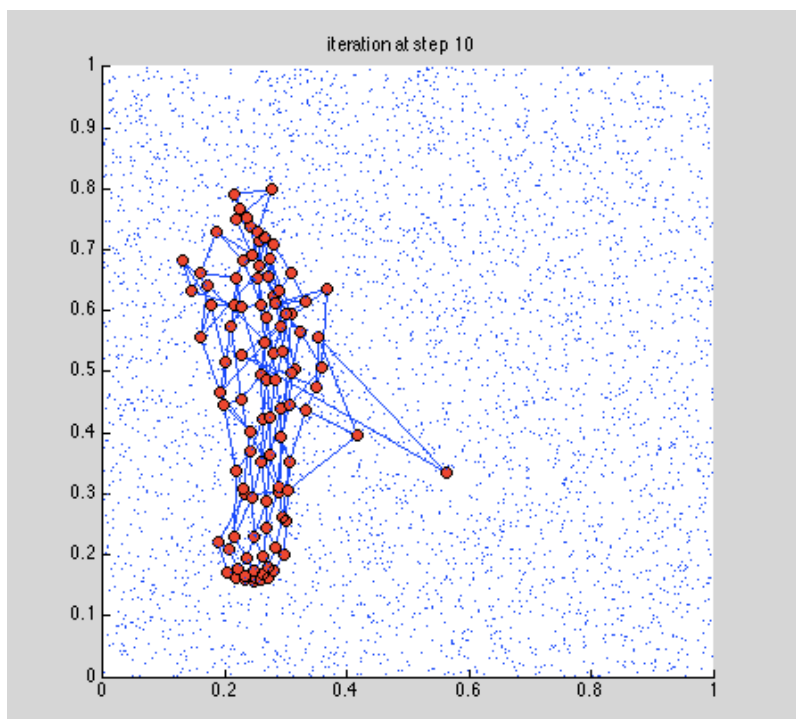
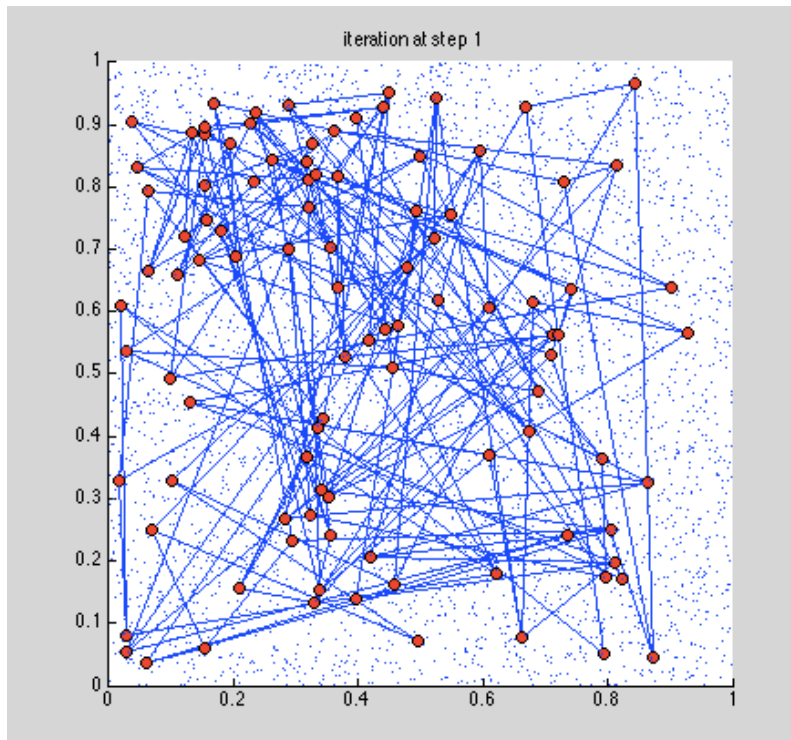
For my Kohonen SOM, I use 10000 steps and set learning rate as variable according to steps. Initial learning rate is as high as 0.6; while when steps approaches 10000 step, rate decreases uniformly to 0.01. Therefore the equation is like $\text{rate} = \text{init_rate} - (\text{init_rate} - \text{last_rate}) * \text{current\#_step} / (\text{total\#_step})$, where $\text{init_rate} = 0.6$, $\text{last_rate} = 0.01$, $\text{total\#_step} = 10000$. Initial weight is set to random floats between 0 to 1.

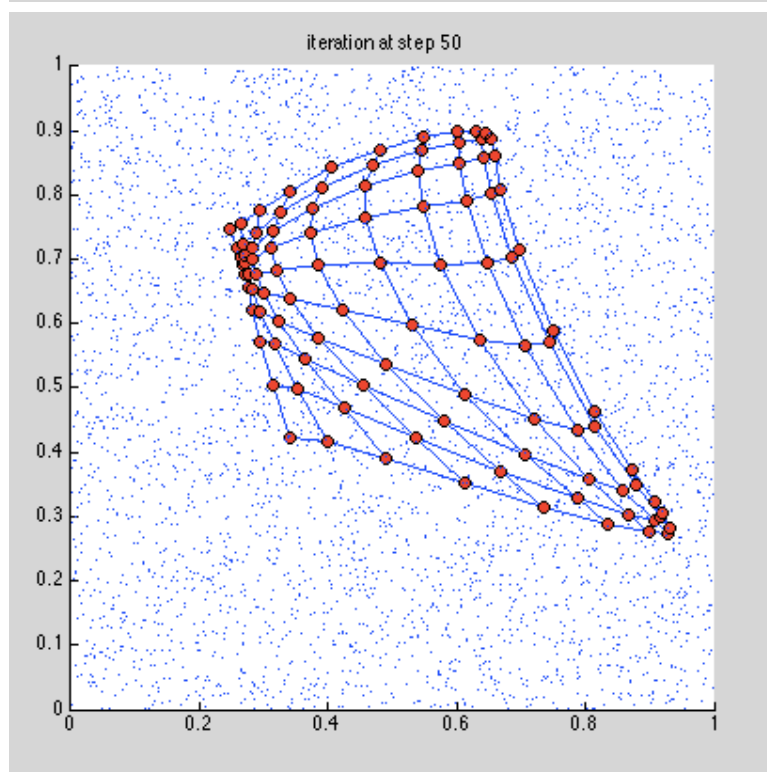
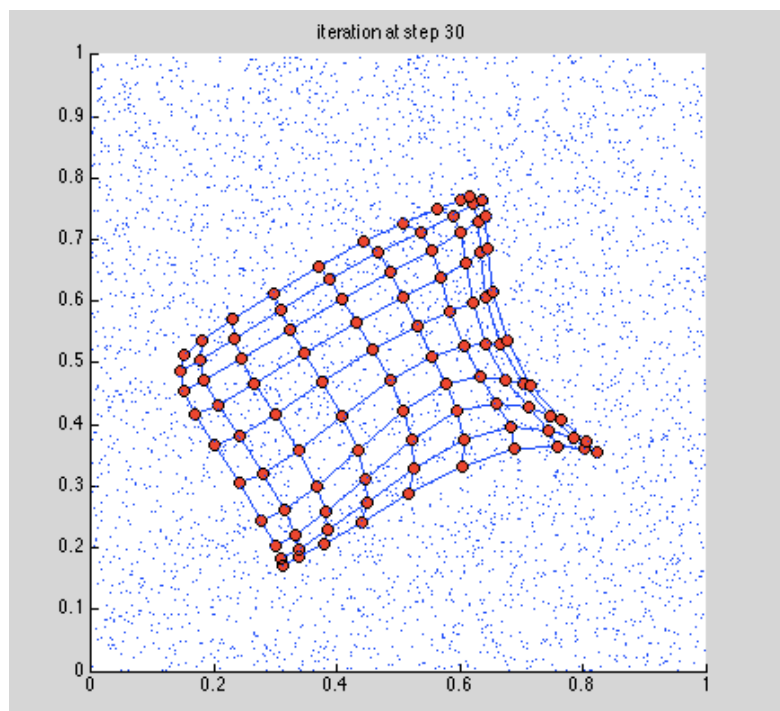
Final weight vectors is like this:

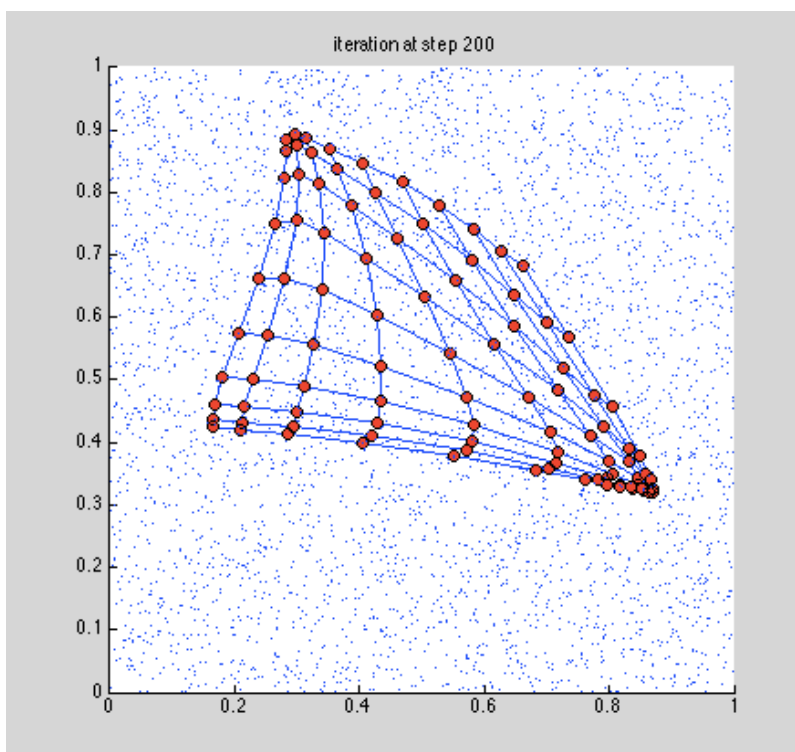
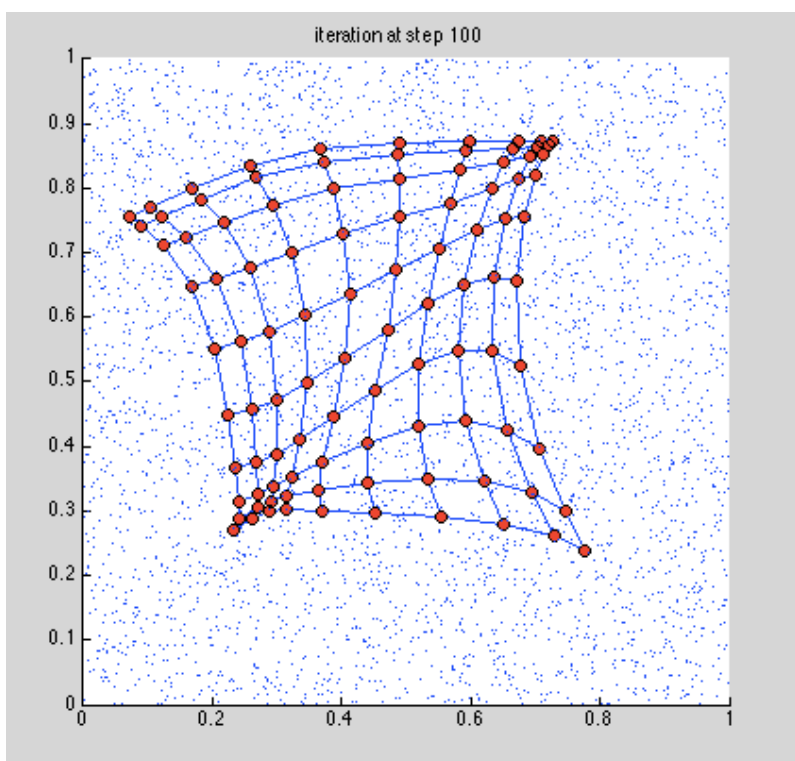


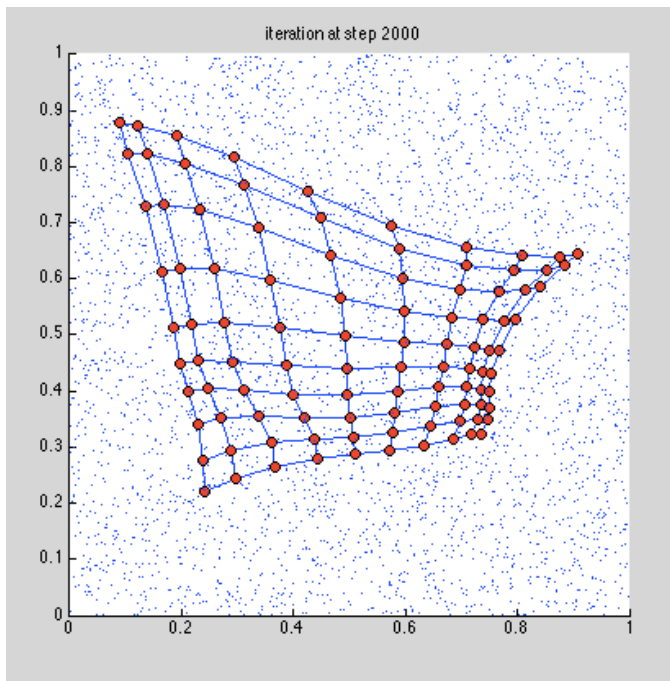
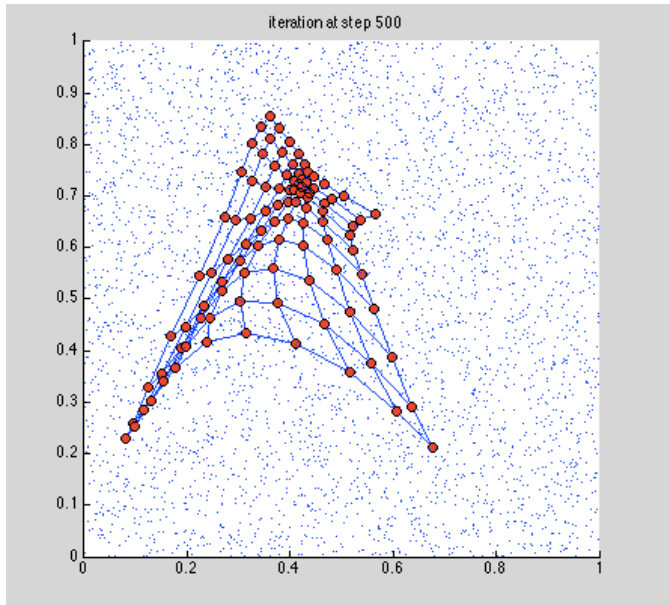
Since inputs are random floats spread in the whole plot above, the result weight is reasonable since it's like a uniformly web that tries to cover all points.

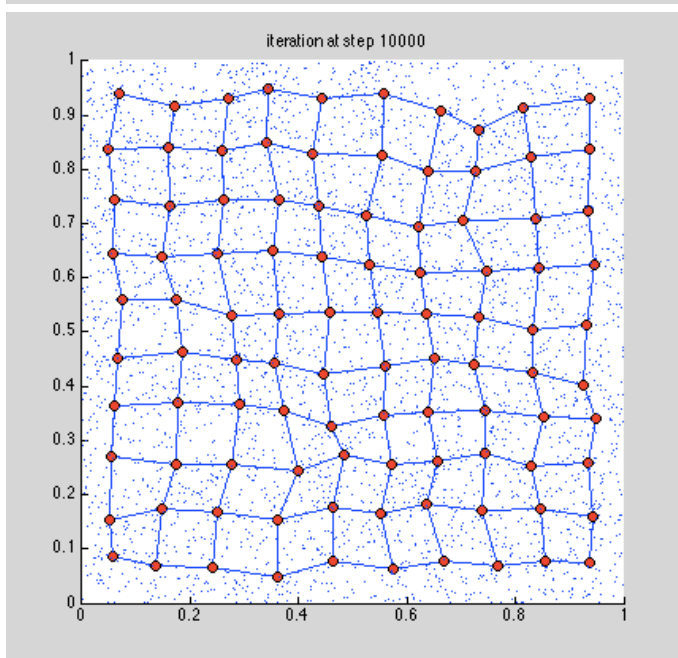
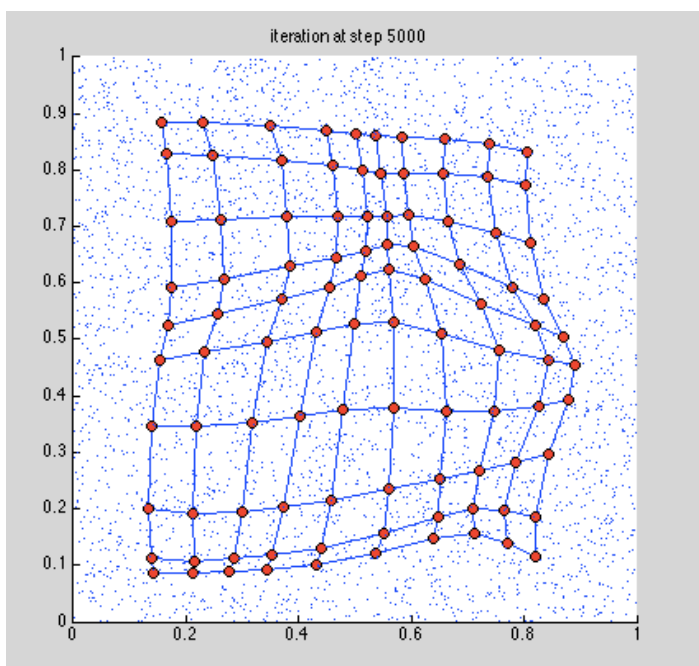
Historical weight vectors at step 1, 10, 30, 50, 100, 500, 2000, 10000:









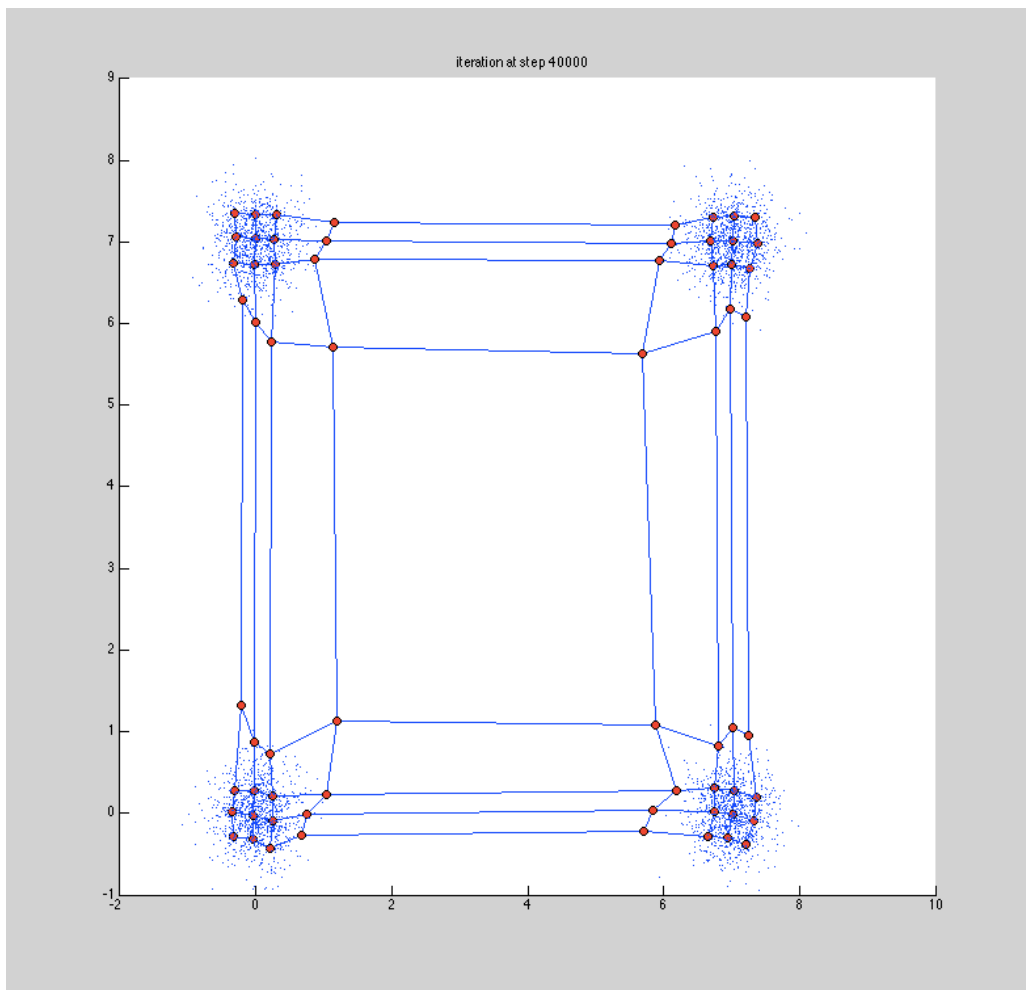


P2.

(a)

For this Kohonen SOM, I use 40000 steps and set learning rate as variable according to steps. Initial learning rate is as high as 0.05; while when steps approaches 40000 step, rate decreases uniformly to 0.005. Therefore the equation is like $\text{rate} = \text{init_rate} - (\text{init_rate} - \text{last_rate}) * \text{current\#_step} / (\text{total\#_step})$, where $\text{init_rate} = 0.05$, $\text{last_rate} = 0.005$, $\text{total\#_step} = 40000$. Initial weight is set to random floats between 0 to 1. Final weight vectors is like this:

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The resulting weights show the structure of 4 clusters, as we expected.

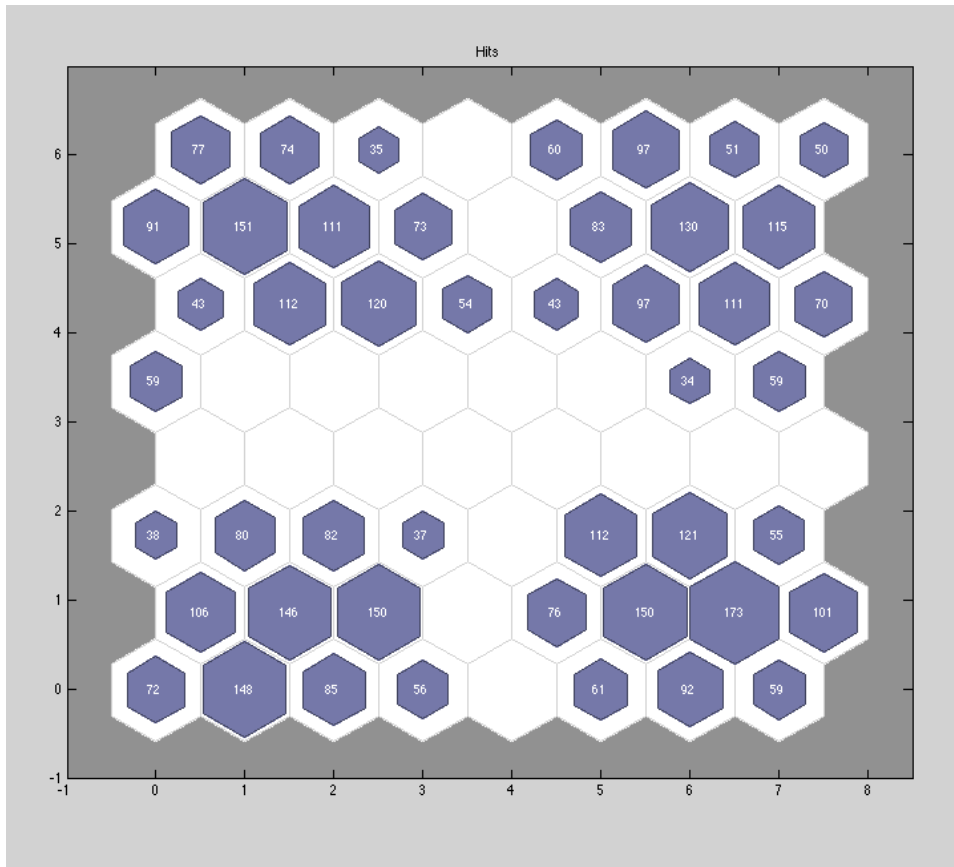
To get a first feel of PE's input mapping number, I use following NN toolbox methods:

```
net=selforgmap([8 8])
```

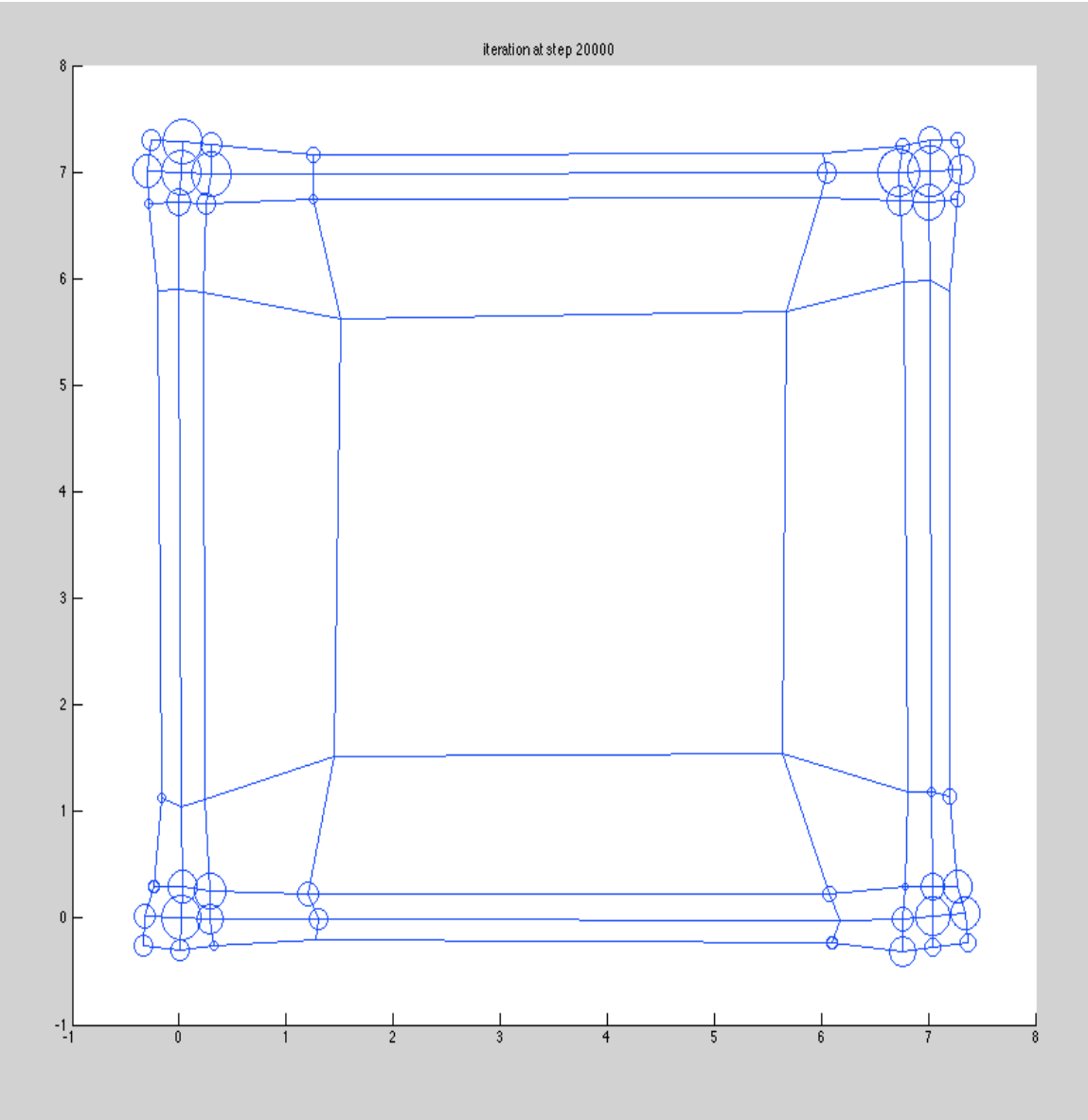
```
net=train(net,x_rand)
```

```
plotsomhits(net,x_rand)
```

and get following figure:

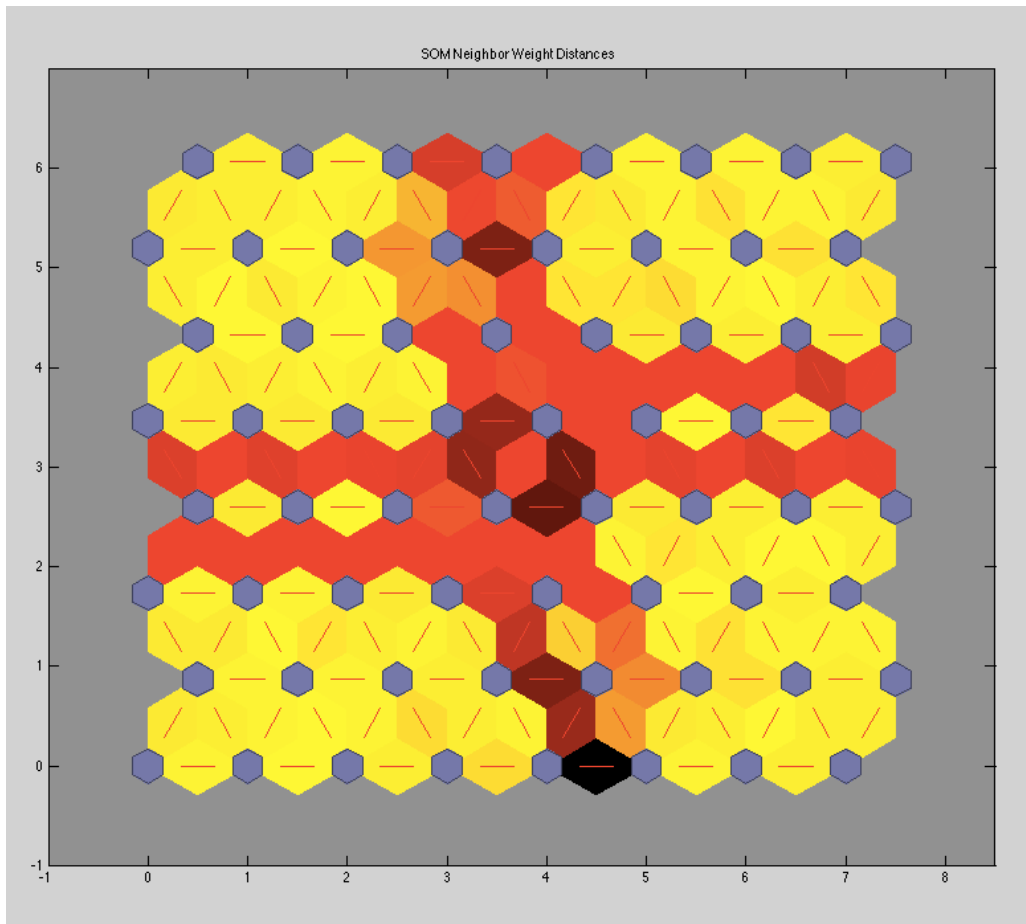


To get my own PE's input mapping number visualization(if I understand the question correctly~), I use circles to denote how many mappings a PE has. The bigger the circle, the more mappings it has. The following is shown as my result



P3.

Neighbour weight distance graph:



So we can see that there are majorly 4 big clusters, which have patterns that corresponds to weight visualization depicted above. The red zones are “dead ” zones where nearly no mappings to PEs here. Yellow zone shows there exist mappings to PEs in this area.